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Biography of Capt. Ericsson.

The success of the *Monitor* in defeating the frigate *Merrimac* has naturally created a desire in the minds of our people to become acquainted with the history of the inventor whose original mind designed the little iron-sided champion of the Union fleet. We have therefore prepared the following brief biography, obtained from reliable sources, accompanied with an engraving from a photographic likeness.

Capt. John Ericsson is a native of the country of Gustavus Adolphus, and is a true Scandanavian, having been born in 1803 in the Province of Vermeland among the iron mountains of Sweden. His father was a mining proprietor, so that in his youth he had ample opportunities to watch the operations of machinery.

When quite young he exhibited a strong predilection for scientific and mechanical pursuits; he was an expert draughtsman, and made several philosophical instruments and miniature machines before he was eleven years of age. The celebrated Count Platen, who was a distinguished civil engineer and an intimate friend of Bernadotte the king of Sweden, having heard of Ericsson's precocious mechanical talents, went to see him. After carefully examining the various plans and drawings which the youth exhibited on this occasion, the Count handed them back to him, simply observing, in an impressivemanner, "Continue as you have commenced, and you will one day produce something extraordinary." These few words of kind encouragement from so distinguished a personage sunk deeply into the mind of the young mechanic, and confirmed him in the choice of that career upon which he had entered.

CAPT. JOHN ERICSSON, THE DESIGNER OF THE "MONITOR."

Soon after this interview young Ericsson was entered as a cadet in the corps of Swedish engineers, and at the age of twelve years he was appointed an engineer under Count Platen, in the construction of Grand Ship Canal, which unites the North Sea with the Baltic. This great canal was chiefly built by the labor of the soldiers of the army, and young Ericsson was required to set out the work for about 600 of them. As the work on this canal was only conducted during the summer months, he was occupied in winter with his pen and pencil in devising plans and making drawings. There are now many important works on the canal constructed after drawings made by Ericsson at this early age.

He afterward entered the Swedish army as a lieutenant at seventeen years of age, rose to be captain and was chosen as a military surveyor of the North Highlands of Sweden. There are in the government archives at Stockholm maps, executed by his own hands, of 50 square miles of territory.

While thus occupied his mind was also engaged on his most favorite topic—mechanical invention, especially the power of highly-heated gases derived directly from combustion. The Colonel of his regiment was his firm friend, and was captivated with experiments he made on a small engine operated with the heated products of Swedish pinewood as a substitute for steam. It was supposed that England was the most favorable country for the development of this new motor, and liberty was obtained from the king to visit London, where Ericsson arrived in May, 1826. Here he fixed his abode, and drew upon the resources of his mechanical genius for his support. He soon brought out a number of new inventions, especially an improved boiler on the principal of *artificial draft*, for the building of which he subsequently associated himself with Mr. John Braithwaite. While thus engaged, in 1829, the Liverpool and Manchester Railway Company offered a prize for the best locomotive engine, to be tested on the small portion of the railway then completed.—Ericsson, not willing to allow this occasion to escape him, immediately set to work, planned the engine, executed the working drawings, and caused the patterns to be made, and the whole machine was completed within seven weeks. The day of trial arrived. Three engines entered the lists for the prize, namely, the *Rocket*, by George Stephenson; the *Novelty*, by Ericsson, and the *Sanspareil*, by Timothy Hackworth.—This was the most important railway trial that ever took place. The *Novelty* was furnished with a bellows draft and winding flue boiler. With its tank it weighed only 3 tuns 17 cwt., while the *Rocket* weighed, with tank, 7 tuns 9 cwt. The latter was the only engine which fulfilled the conditions required, but the London *Examiner* of Oct. 6, 1829, describing the trial, stated that the *Novelty* attracted universal admiration on account of its beauty and the work which such a small engine performed. It darted along at the rate of 30 miles per hour, and it drew a load of 28.5 tuns—its own weight included—at an average speed of 8 miles per hour.

The greatest improvement ever applied to steamships of war is due, we understand, to Capt. Ericsson—we mean the screw propeller and the arranging of all the machinery under the water line. The screw is an old device, but it had been laid aside as an entire failure, until he resuscitated it and proved its utility on a small boat on the river Thames, which the jolly watermen called *The Flying Devil*. He invited the Lords of the British Admiralty to take a trip in this little vessel, for the purpose of showing them how the screw operated, and to give an explanation of the machinery, and the advantages of placing it below the water line, out of the reach of shot. The Admiralty authorities took the trip, but Sir William Simonds, then Chief Naval Constructor, concluded the interview by asserting it was impossible to steer a war vessel having a screw placed at the stern.

Such was the bright conclusion arrived at twenty-six years ago, respecting the merits of the screw by the leading naval constructor in England. The only steam vessels then used in the Britsh Navy had paddle wheels, and a considerable portion of their machinery was above the water line. Not a paddle-wheel steamer

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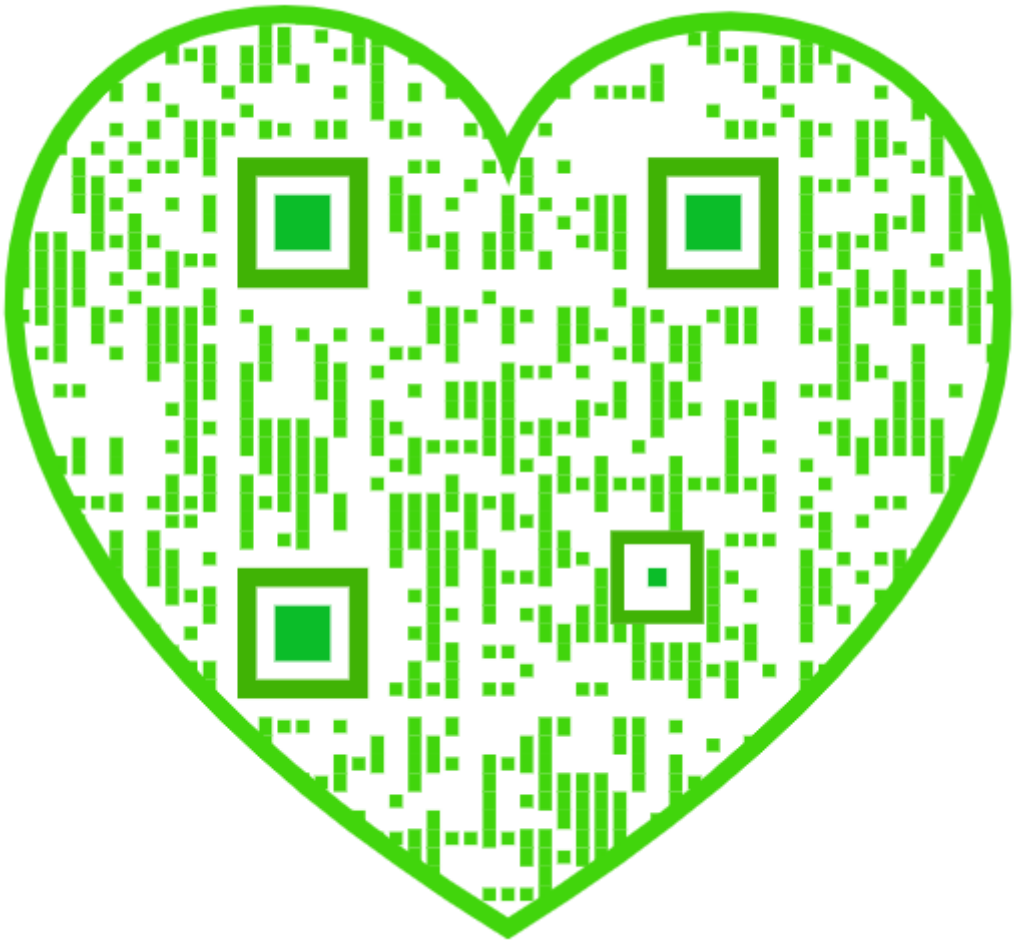

has been built for that navy in fifteen years. There were two Americans who had examined Captain Ericsson's drawings, and had taken a trip on his little propeller, and they appreciated its merits. One of these gentlemen was Francis B. Ogden, Esq., our Consul at Liverpool; the other, Commodore Robert F. Stockton, U. S. N. Through the influence of the latter Capt. Ericsson came to the United States in 1839, and in 1841 became engaged with him in building the U. S. steam frigate *Princeton*—the first successful propeller war vessel ever constructed for any government—with all its machinery under the water line. Bennet Woodcroft, Esq., of the British Patent Office, in his treatise on screw propulsion, gives Capt. Ericsson the praise which he merits, and in France he is called the father of screw propulsion applied to war vessels, as he designed the *Pomone*, the first screw vessel in the French navy.

The inventive mind of Capt. Ericsson has been engaged on various mechanical objects. He was among the earliest constructors of steam fire engines, and obtained the gold medal of the New York Mechanics' Institute, in 1842, for the best design of such engine. For several years past his name has been prominently before the country in connection with the caloric engine, and it has become deservedly famous once more by the *Monitor*. Our Naval Department selected his design as one of the successful three accepted, according to advertised proposals last year for iron-vessels. He signed the contract for its construction on the 5th of last October, and she was launched on the 31st of December. The *Monitor* was completed just in the nick of time to save our entire blockading squadron at Fortress Monroe from destruction, and thus redeemed the credit of our navy. What the *Monitor* did in Hampton Roads, March 8, 1862, need not now be repeated. Her success electrified our people, and they feel grateful to the inventor whose genius and mechanical skill have been devoted to the construction of this invulnerable floating battery.

Capt. Ericsson is a profound geometrician, and has a most original and active mind. He is now 59 years of age, but looks to be fifteen years younger. He is above the middle hight, and has a strong and robust frame. In youth he has been fair in complexion, like "the blue-eyed warriors of the Gothic North;" and, judging from his appearance, he will live another generation.

NOTES ON MILITARY AND NAVAL AFFAIRS.

CAPTURE OF BEAUFORT, N. C.

In our last number we announced the capture of Newbern, N. C., after a most brilliant attack upon its intrenchments by the Federal troops. Surprise is expressed that the Confederates did not make a more desperate resistance. One of their fortifications was found to be a formidable work, well armed, and if the garrison had fought with a hearty love for their cause the loss of life among our brave troops must have been terrible. It is very evident that the Confederates in North Carolina have no zeal for Jeff's cause, and would gladly attach themselves once more to the glorious old ensign if they could safely fall in under its folds. The State of North Carolina feels the loss of the Northern market for the sale of its valuable products of wood, pitch, resin, tar, turpentine, &c., and can hope for little prosperity so long as the rebellion holds out against the government, which requires a rigid blockade of her ports. After the capture of Newbern, Gen. Burnside ordered a movement upon Beaufort, a town of about 2,000 inhabitants and a port of entry on the seaboard. This place is defended by Fort Macon, a work of considerable strength costing about $450,000. On the approach of the Federal forces the place was evacuated, and report says the fort was blown up with all its armament. Our readers will remember that the steamer *Nashville* put into the port of Beaufort, having escaped the vigilance of the blockade. This steamer was principally owned in New York, and was seized in one of the Southern ports during the early part of our troubles. It is said she has again made her escape by running the blockade. The capture of Beaufort is of great importance, as its harbor is of sufficient depth to accomdate large-sized vessels. Gen. Burnsides operations thus far have been marked by prudence and energy, and the President has but expressed the general voice of the whole people toward the gallant officer in promoting him to the rank of a major general.

SEVERE BATTLE NEAR WINCHESTER, VA.

On Saturday, March 23d, the Confederates, under Generals Jackson, Longstreet and Smith, advanced upon Winchester, Va., and drove in the Federal pickets, and with a battery of artillery commenced playing upon our troops. At night both armies drew up in front of each other, and awaited morning to renew the contest. The Confederate force was estimated at seven thousand infantry, twenty-eight pieces of artillery and twelve hundred cavalry, and were reinforced on Sunday morning by five thousand more. The Union troops did not exceed ten thousand, being a portion of Gen. Banks's division, who were then under command of the brave and gallant Gen. Shields. There the enemy were strongly posted in woods and behind a stone wall, and their artillery was posted on eminences on both sides of their left wing. Our whole artillery force engaged consisted of four batteries, of twenty-four pieces in all. The contest raged furiously till three o'clock in the afternoon, the fighting being done chiefly by the artillery and musketry, at a range of not more than three or four hundred yards, and often much less. The Confederates on our right undertook to capture Doane's battery by a charge. The first effort was nearly successful, but the heavy discharge of grape compelled them to retire in confusion. A second and weaker attempt likewise failed, and the enemy fell back with loss, behind the stone parapet. Gen. Tyler now ordered his brigade to charge the enemy's batteries on the left, and a most deadly encounter followed. Twice our men reeled under the storm; but in the third effort they routed the Confederates with tremendous slaughter and amid loud cheering. Our men rushed forward with yells, when a panic among the enemy ensued. Our troops followed, and drove them till dark, capturing three guns, three caissons, muskets, equipments, &c., innumerable. The loss on both sides is represented as very great, and the defeat of the enemy complete. We regret to hear that Gen. Shields was severely wounded in the arm during the early part of the battle, and it is thought he would need to have it amputated. The latest intelligence states that Gen. Banks was pursuing the enemy, that they abandoned wagons along the road filled with dead and dying; the houses on the route were found crowded with the wounded and dead, and the dwellings in the towns adjacent to the battle field of Sunday were also found filled with the wounded. Our artillery was making terrible havoc among the enemy in their flight, and the route bids fair to be one of the most dreadful of the war. It is also reported that Gen. Banks has overtaken and destroyed two hundred of Jackson's wagons.

THE MORTAR FLEET.

Information about Porter's mortar fleet, which is now in the Gulf of Mexico, is looked for every day. The impression prevailed in some quarters that it had already captured the city of New Orleans, but we see nothing in these reports but vague rumors, which it is useless to put in circulation. A few days more, at best, will bring authentic knowledge of its operations; therefore, a little patience is commendable. It is quite certain that this formidable fleet will make a loud noise somewhere.

THE SECRETARY OF WAR AND THE NEWSPAPERS.

The Secretary of War announces his determination to hold all newspaper publishers to a strict account for any infringement of his military order which requires of them to withhold the publication of information concerning army movements, and has established a sort of court martial for the trial of all delinquents. The press should be exceedingly cautious not to develop any plans or movements such as may be useful to the enemies of the government. There are enemies enough in camp, and at the seat of war, ready to convey all possible information about our army movements without the greater publicity of the press, whose mission it should be to strengthen and not to betray the government.

HEAVY PROJECTILES.

The Fort Pitt Works, at Pittsburgh, have recently sent forward several immense projectiles for the "Union" and "Floyd" guns at Fortress Monroe. Those for the "Union" gun are of the elongated pattern, and those for the "Floyd" round. These balls are cast so as to secure even greater strength than if made solid, the core being but four inches in diameter. This opening is filled with lead, the ball when complete weighing four hundred and thirty pounds. They are not made of the common metal used in other shot and shell, but of the very best quality of gun iron—almost as hard as chilled iron, and nearly as tough as wrought iron. The heavy gates are turned off in a lathe, and the balls are finished up in the ordinary "ball mill," leaded and shipped. It is reported that the "Union" gun is to be transferred to the *Monitor*, and the dispatch with which the projectiles for it are being hurried up, would go to show that the rumor may not be altogether without foundation, although we incline to the opinion that they will be placed on a larger-sized vessel.

ENGLISH GUNS.

We stated in our last number that not a single Armstrong gun had ever fallen into possession of the secessionists, as was alledged by the daily press. Armstrong guns are made only for the British government. The foreign rifled cannon obtained by them are Blakely's. One of these guns is now in the navy yard at Washington, which was captured at the Evansport battery on the Potomac. The gun is a splendid piece, weighing 7,542 pounds, and bears the inscription, "Blakely's patent, 1861," thus showing it to be of English manufacture. It is calculated to carry a 7-inch shell or a 159-pound rifled ball. It was found loaded with two shells, which were taken out at the Ordnance Department. It had also been spiked with a rat-tail file, which was driven through the vent, and is now in as good condition as when first brought into the field.

WHISKY VS. CANNON.

In a recent proclamation Governor Brown of Georgia commands the people of that State to cease the manufacture of ardent spirits after the 15th of March, on pain of having their stills seized for the use of the government. He also forbids its transportation by the State road. The proclamation concludes as follows:—"We need more cannon with which to meet the enemy. Gun-metal used in the manufacture of field pieces, is composed of ninety parts of copper and ten of tin. The copper stills of Georgia, which are now heavy columbiads of destruction aimed against our own people, would, if manufactured into cannon, make many a battery of six-pounders, to be turned against the enemy. Upon this material thus employed in our holy cause, we could invoke God's blessing. Upon it as now employed we can only expect his curse."

NEW IRON-CLAD GUNBOATS.

We understand that Capt. Fox, Assistant Secretary of the Navy, has recently visited this city to look after the immediate construction of four floating batteries exactly, or nearly, like the *Monitor*, and the preliminary arrangements have been made with Captain Ericsson. The batteries are to be built with all possible dispatch. Only one improvement, and that a trifling one, can be pointed out. It is the substitution of a cylindrical, instead of a square form in the little pilot house. Another alteration of doubtful expediency has been suggested, viz., the transfer of the pilot house from its place about a rod from the turret, to the top of the turret, giving to that "Yankee cheese box" the appearance of a telescope with one joint drawn out.

The total number of torpedoes found in the river and on its banks at Columbus is over four hundred. They were water-logged, and therefore were harmless.

Infernal Machines in the Mississippi.

A letter from Columbus, Ky., gives the following account of several infernal machines found near that place, which had been constructed under the authority of Right Rev. Major-General Bishop Polk:—

No. 1 is a machine intended for submersion in water, of a cylindrical form and built of No. 16 sheet iron. It is about five feet in length and fifteen inches in diameter, ending conically. In the interior is a bag, presumed to be impervious to water, and containing the explosive materials. One end of the bag contains a mouth piece in which is inserted a tube perhaps an inch in diameter. There is a nipple on the end of this tube, arranged for the reception of a percussion cap, on which a hammer is made to act by means of a simple lever arrangement.

No. 2 is intended for land uses, and is made of cast iron. It is shaped like an old-fashioned tea kettle in some respects, and has a sort of cap on the top similar to the lid of an iron tea kettle, which is fastened to it by a set of iron of screws. About two inches from

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the bottom are two orifices through which run copper wires, insulated with gutta percha and tarred cord, which are laid in trenches and communicate with a galvanic battery inside of the fortification on the bluff. This infernal machine is a specimen of many that lie buried in and about Columbus, several of which have been discovered.

No. 3 is intended for the water, and is a cast-iron cylinder, twenty inches in diameter, and twenty-four inches long, the ends being cast solid. Attached to one end are four clevices for the purpose of fastening it to supporters.

No. 4 is another water machine, being a plain cylinder twenty-six inches long and twelve inches in diameter, made of heavy boiler iron, and riveted in the style of a steamboat boiler. This likewise has two flat ends, one containing some brass arrangements, which it is difficult to designate the use of. The affair looks as if it might be a very destructive missile, if properly managed.

The Ore from which the Iron of our Great Guns is Made.

On this subject one of our Pittsburgh Pa. cotemporaries says:—The public may feel interested to learn the character of the iron ore deposits from which the best cannon yet made for the government are manufactured. We allude to the Bloomfield ore, which is admitted to be the best in use, and from which nearly all the guns cast in the city are made. This ore is obtained from a ridge in Blair county, about seven miles long, one mile in width, and some two hundred feet in hight. All the ore found on this ridge is hematite. There are four different qualities of it found, and of course like all hematite ore, they are found in different and separate beds, or nests—special deposits—along the whole ridge. Each kind or quality is found in a separate bed or nest. The two principal, and the only ones now used, are called soft hematite and hard hematite. The soft hematite is the poorer, and is that which is now used at Bloomfield and Martha furnaces to make the pig metal of which the cannon are made at Pittsburgh. The hard hematite is principally used at Sarah furnace, and is not considered so good and well suited for cannon as the soft hematite. The other two qualities of hematite ore which are found in this ridge, have a shining soap-stone like appearance, one of them being of a reddish, and the other of a yellowish color. Openings have been made along the whole length and across the whole breadth of this ridge, at short distances apart, and the ore found at all the different points. The ore was first used and worked at Woodberry furnace, which was erected many years ago by Dr. Shoenberger and John King. In the course of time, when the wood to make charcoal became scarce at that point, Dr. Shoenberger removed the furnace to the present site of Bloomfield furnace, at the northeastern end of the ridge, which is the end of it nearest to Hollidaysburg, or rather he erected a new furnace at Bloomfield, removing the fixtures, &c., from Woodberry. The deposit is ninety feet thick, and of unknown width, so that hundreds of furnaces might be supplied from it without any danger of the supply giving out.

Nicotine Found in the Viscera of a Snufftaker.

M. Morin, of Rouen, anxious to ascertain whether nicotine could be detected in the viscera, subjected the lungs and liver of a snufftaker, who had died at seventy, to a careful analysis, and found the alkaloid just mentioned. Portions of the lungs and liver were reduced to a pulp and soaked in distilled water, slightly acidulated for the lungs with sulphuric acid, and for the liver with oxalic acid. Several days afterward, the liquor was filtered through paper free from carbonate of lime, then concentrated to a third of its volume, and filtered again to free it from the flakes which had formed. It was now once more evaporated, and treated with pure alcohol, when fresh flakes formed. The alcohol was then removed by heat after filtration. The residue was mixed with a small quantity of pure potash. On cooling, sulphuric eiher was added; and, after a few hours, the decanted liquor was evaporated in vacuo. The substance now obtained, having the smell and the acrid taste of nicotine, was treated by the bichloride of mercury, chloride of platinum, tannin, biniodide of potassium, the salts of copper and lead, and with all the reactions of nicotine were obtained.—*Lancet.*

A New Fusible Alloy.

B. Wood, M. D., of Indianapolis, Ind., makes the following communication to the *American Journal of Science and Arts*:—

In this *Journal* for September, 1860, will be found a notice of the cadmium alloy discovered by me, consisting of from one to two parts of cadmium, two parts of tin, four parts of lead, and from seven to eight parts of bismuth, and so exceedingly fusible as to melt below the temperature of 160° Fah. A brief description of another alloy similar in character and scarcely less remarkable is herewith submitted; it consists of cadmium one part, lead six parts, bismuth seven parts. This alloy melts at about 180° Fah., being nearly midway between the melting point of the old fusible metal consisting of the three metals, tin, lead and bismuth, and that of the alloy first mentioned consisting of the four metals, cadmium, tin, lead, and bismuth. It is remarkable as exhibiting the liquidifying property of cadmium in certain combinations; also in the fact that while the mean melting point of the constituents composing it is much higher than that of those composing the old fusible metal, it melts at a much lower temperature—being more fusible than any other alloy yet known consisting of but three metals. It has a clear, brilliant metallic luster that does not readily tarnish. Its color is a bright bluish gray, resembling platinum; when cast, its free surface presents a white frosted appearance. It is very flexible in thin plates, and breaks with a hackly fracture; but when thicker bars are broken, the fracture is smooth, resembling that of tempered steel. It is malleable but not perfectly so. In hardness it is about the same as bismuth, and about the same as an alloy of two parts of lead and one part of tin, or coarse solder, which it resembles more nearly in other respects. It may be that more approved methods of measuring temperature will give the alloy a still lower melting point than above ascribed to it, as I see that the experiments made by Lipowitz with my fusible metal indicate for it a much greater fusibility than my measurements. (Lipowitz found that "Wood's fusible metal," when made of eight parts of lead, fifteen parts bismuth, four parts tin and three parts cadmium, fused at 140° Fah.)

Resources of Madagascar.

The following particulars respecting the mineral resources of this island are extracted from a letter addressed to the *Opinione Nationale*, by M. Simonin, a mining engineer, who recently returned from a voyage in the Indian seas:—I will not discuss the claims which France may have to Madagascar, nor the advantages that would accrue from the possession of a good port there for the French navy, but will limit my remarks to a brief statement of the mineral riches of the island. Ores of lead, silver and copper are found in great abundance and extraordinary purity; but the most important fact is the abundance of iron ore on the east and west coasts in shining black grains containing at least 60 per cent of pure iron, without any admixture of other metals. The inhabitants have long since learned to forge this iron, which is exactly the same as the Swedish, so much prized in England for converting into steel. Coal of superior quality also abounds; several specimens, which I analyzed myself, presented precisely the same qualities as the best Welch coal from Cardiff. Some of the coal is also very rich in gas. I observed that the gas which escaped from my crucible burned with a clear bright flame. I now come to another point of scarcely less importance. The island contains abundant mineral springs, possessing the very virtues required to cure the diseases engendered in the unhealthy districts along the coast. Dr. Milhet, of Reunion, who went several times to Tananarive, at the request of the late Queen, brought back samples of these waters, and our analysis proved them to be nearly the same as some of the Vichy springs, and excellent for affections of the liver and stomach. They are effervescing, alkaline, and ferruginous; their temperature when taken from the springs is about 35° C. (95 Fah.) It is most desirable that the French government should purchase some of the springs and erect a bathing establishment, which would be an immense boon to the soldiers suffering from the pernicious fevers contracted at Mayotte, Nossi-Be, and Saint Marie. The other mineral resources of the island are rock salt, pozzolane, asphalt, niter, rock crystal, and oil which are found in great quantities.

[Madagascar is the largest and most important of the African Islands in the Indian Ocean and is separated from the mainland by the Mozambique channel which is 300 miles wide in its narrowest part. It is estimated at 240,000 square miles and contains about 3,000,000 inhabitants and is exceedingly rich in its mineral, botanical and agricultural resources.—Eds.

Start Your Tomatoes.

The following are some very excellent suggestions on this topic by a correspondent of the *New England Farmer*:—

The tomato is now so universally relished that it is almost superfluous to urge its claims. The first aim should be to get early varieties, and the yellow plum is among the earliest and the best flavored tomato. The large, smooth red is nearly as early, and is a very good variety. The next important item is to get them started properly before the season for planting out, and in this there is often a great failure. The best method is to plant the seeds in small flower pots, five or six inches in diameter at top. These have an inch or two of coarsely broken charcoal placed in the bottom, and they are then filled with some porous soil; that taken from an old hotbed is good, or well decomposed muck and sand, with a little very fine manure, or better still, a mixture of one-half each of leaf mold and good sand, and a few seeds planted in each pot, and the pots placed in the windows close to the glass. When the plants are up strong, thin them out with a pair of scissors as often as there is the least appearance of crowding, taking care to leave the best plants until all but one are cut out, one near the center of the pot being preferred. Water is supplied in sufficient quantity to prevent any withering, but do not keep the soil very wet. The time for planting is usually about the first of March, but if planted April first, they will do much better than out door plants. A few of these, for very early fruit, are planted in a slight hot-bed, late in April, and when danger from frost is past the glass is removed. The remainder are planted in open ground as soon as it can safely be done. The best and most productive plants last year were planted out in ground prepared for melons, by plowing into a strong loam a liberal dressing of sand and manure, and then preparing hills by mixing three shovelsful of horse and hog manure with plenty of sand and loam—the hill when finished being raised a few inches. When I wish to remove the plant from the pot I place one hand over the surface, with the plant of course between the fingers, and invert it, rapping the pot slightly. A little exposure to the out-door air during the middle of the day, however, for a few days previous to planting out, is beneficial. The first fruit which ripens should always be saved for seed, and if two or more varieties are cultivated they should be planted as far apart as convenient, in order to prevent mixing. If trained on the sunny side of a building or fence, the fruit will be sweeter as well as earlier. An abundant supply of sand in the soil also produces a similar effect.

English and German Steel at the World's Fair.

The London *Times* says:—Sheffield this year must look to itself when it enters the list against its German rivals. Krupp's steel works at Eissen, in Rhenish Prussia, have gradually attained a world-wide celebrity for the almost military discipline which prevails there, and for the extraordinary steel castings it turns out. Only two or three years ago scientific journals contained accounts of the manner in which the almost impossible feat, as it was then considered, of making a piece of cast steel weighing 11 tons was performed. But Krupp will send to the Exhibition this year one piece of cast steel weighing no less than 21 tuns. Ten years ago the manufacturer who talked of making such a casting in steel would have been thought little short of insane.

The Common Council, of the city of New York have passed a resolution appropriating $500,000 for harbor defences. The appropriation has not yet received the sanction of the Mayor. The object of it is stated to be the more effectual manner of guarding the approaches to the city against the entrance of iron clad war vessels. How it is to be applied, has not yet been described.

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HISTORY OF TURBINE WATER WHEELS.

Number III.

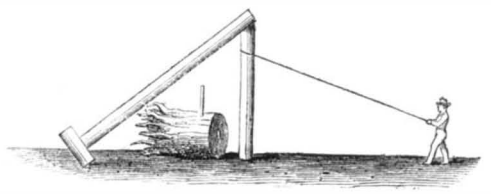
The turbine water wheel has been a subject of great interest to a large number of the scientific engineers of Europe, more especially those of France. In 1825 the French government exhibited so much commendable enterprise respecting improvements in this species of wheels, that a reward of six thousand francs was offered to any person who should succeed in making and arranging a turbine that would give out no less than 70 per cent of the power of the water employed upon it. The attention of M. Fourneyron, of Paris, was then specially directed to the subject, and he commenced to construct a turbine under the impression that the great defect which had previously existed in reaction water wheels was an improper form of bucket. He was an able mathematician, but is said not to have been a practical mechanic. An immense amount of toil and time were consumed by him in making investigations respecting the curves which he should adopt for the guides and buckets of his wheel. His favorite idea was to make the water act upon an inclined plane in the curves of the buckets, as in the thread of a screw, and to make the water impart its total velocity to the wheel. His first wheel was built with its orifices of discharge larger than the inlet passages, thus affording evidence that he was then unacquainted with the true principles which govern turbine water wheels. All his hopes of improving reaction wheels were then based upon obtaining buckets of a proper curvature for the action of the water upon them. M. Fourneyron continued his experiments from 1825 till 1832, and during these years he built five experimental wheels, but none of them came up to the standard of power (70 per cent) to draw the government prize. At last, in the latter part of 1832 the idea occurred to him to try the effect of reducing the area of the discharge openings of his wheel to the same size as its inlet orifices. The result of this modification in its construction increased its working power so much that he succeeded in drawing the government prize of six thousand francs. His great perseverance received its deserved reward at last. This water motor was called "Fourneyron's French Turbine," and was the first reaction wheel that was built in Europe which combined the whirling inlet motion of the water, with the reaction principle.

M. Fourneyron published drawings and a description of his wheel after he had succeeded in obtaining the prize, but it is charged against him that these drawings represented the wheel as it was before it had been altered, and having its discharge openings larger than its inlet passages. A deception, therefore, is stated to have been practiced upon the hydraulic engineers of Europe. One of Fourneyron's French pamphlets was obtained by a civil engineer in Philadelphia about 1841, and he immediately took a deep interest in its contents. Soon after this he made contracts for building several of Fourneyron's wheels with wide issues, all of which wheels, we have been given to understand, were failures. Fourneyron in France, and the brothers Parker in the United States, commenced experiments about the same time with reaction water wheels, but the latter completed their improvements several years before the former. Their improvements, however, appear to have been made unknown to one another.

The Jonval Turbine is another French wheel, and perhaps it is now more generally used than any other. It was invented by M. Jonval, a French patternmaker, after Fourneyron had completed his improvements. In the Parker and Fourneyron wheels the water was admitted at the center and discharged at the periphery. Jonval placed a series of stationary curved guides directly above his wheel; the water passed down through them, entered the buckets of the wheel at the center and discharged underneath in an inclined spiral direction. This was effected by placing a hoop upon the circumference of the wheel and the issues underneath. The three wheels have been called respectively "percussion and reaction wheels" and "centrifugal and reaction wheels." Names are not always correct, but this is of minor consequence, when the principles involved are known. A leading feature in all these wheels was giving the inlet water a whirling (also called vortical) motion coinciding with that of the wheel. The Parker wheel imparted the whirling motion by a helical guide; Fourneyron and Jonval with a series of curved guides. Jonval also applied the "draft box" to his wheel, and so successful was it in France that M. Emele Geyelin, a skillful French engineer, came to Philadelphia for the purpose of introducing them into the United States. He however made his wheels under a license from Messrs. Parker until their patent expired. Jonval's improvements in France were antedated, ten years at least, by the patent of the American inventors.

BLASTING AND SPLITTING STUMPS WITH PERCUSSION CARTRIDGES.

Messrs. Editors Scientific American—*Sirs*:—As my plan of splitting stumps and other large timber by means of my percussion cartridges, is now very extensively used in Ireland, for the purpose of procuring fuel, I inclose a diagram of the *modus operandi*, which I shall feel much obliged if you will be so kind as to have copied into your periodical, as a correct knowledge of the operation will be useful all over the world. The *phlogistic pill* is composed of heads of Bell's lucifer matches, mixed with small pieces of broken glass, and inclosed in a muslin nut shell.



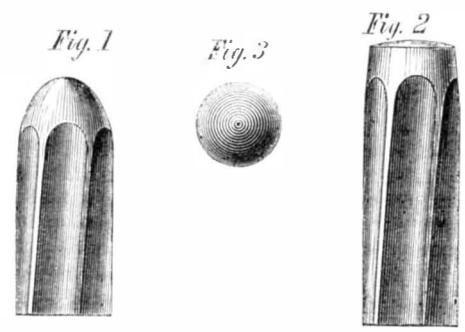
Bore a hole with an inch auger more than half way down into the most unwedgable part of the stump, then insert the cartridge, and ram it home to the bottom by means of the round iron bar; draw out the bar which is of the same diameter as the auger that bores the hole; then drop in the phlogistic pill, and insert the round iron bar to within three or four inches of the pill. It may be supported in this position by a piece of small wire passing traversely through the bar, and resting on the surface of the stump. A heavy plank of wood, having a short transverse plank on its outer end to keep it steady, is raised about three or four feet above the projecting head of the iron bar, and supported in that position by a stout pillar of wood; a long cord is tied to the upper part of the pillar, and, when all is ready, by pulling away the pillar, the plank falls on the bar, exploding the cartridge and rending the stump in many pieces. The iron bar may be attached to the pillar with a short strong cord, so as to find it easily on the broken ground. The iron may have a recess cut in its lower end to hold the phlogistic pill, so that the pill may be withdrawn if it should not be expedient to fire the charge at the time appointed. The explosive power of the cartridge is more efficient when fired in this manner than when fired by a fuze and tamping, because the fuse method is slower in igniting the whole of the powder. Yours truly.

J. Norton.

Howard's Hotel, Dublin, Feb. 22, 1862.

THE BEST SHOT FOR PENETRATING IRON PLATES.

Several correspondents have recently suggested the employment of flat-headed iron bolts for penetrating the armor of iron-clad frigates, and a number of inventors have visited us lately to present the same idea. One correspondent believes that if flat-headed iron bolts had been fired against the *Merrimac*, they would soon have pierced through her iron sides and crippled her effectually. One inventor recently visited us and recommended the use of solid flat-headed steel bolts and from some minor experiments which he had made, he is convinced that such missiles will penetrate through inclined plates instead of glancing from them upward, like the round and pointed shot that were fired at the *Merrimac*. He stated that the flat-headed bolts struck inclined plates edgewise and cut into them without being deflected. This appears to be a valuable idea and may prove useful in firing against angular-plated vessels.



Experiments and practical information on the best form of shot for penetrating iron plates, are certainly of great value at this time.

In the annexed engraving we have represented three varieties of shot, namely, the flat-headed bolt of Whitworth, a conical long bolt and a spherical shot. The flat headed bolt is that which Whitworth has used in his hexagonal rifled gun, and with regard to it he says, "If it be required to fire through plates of iron a flat-fronted projectile of steel of this form will be employed." With respect to range it was found, by experiment, that the pointed long bolt, Fig. 1, fired from the same gun with the same charge of powder, had a very insignificant advantage. Mr. Whitworth says further respecting the flat headed shot, Fig. 2. "It has many advantages. Besides being the form best adapted for firing against iron plates, it may be used for penetrating through water." For firing against elastic materials and into masonry, such as stone forts, tubular bolts (long shot with a hole through the center), slightly flattened in front were found most effective.

In October, 1861, experiments were made at Shoeburyness, England, which seem to afford contradictory evidence to Whitworth's opinions regarding the efficacy of flat headed bolts fired against iron plates. A target 20 feet by 10, representing a section of the hull of the *Warrior* was set up against a bank of solid masonry. The iron plates were 4½ inches thick, the backing of teak behind was 18 inches thick and behind this was the inner iron plating five-eighths of an inch making 5⅛-inches in thickness of iron and 18-inches of wood—a total of 23⅛ inches in thickness. The battery was situated at 200 yards distant and consisted of three 100-pounder Armstrong guns, and two 68-pounders smooth-bored guns.

The first operations were with shells filled with sand, and to the astonishment of all present the 68-pounders did more execution than the three great Armstrong guns. This was accounted for by the greater velocity of the round shot at short ranges when fired from the smooth bored guns. After firing with shells, solid shot was then tried with all the guns, and 200 lb. bolts were used in the 100-pounders with charges of 16 lbs. of powder. Even with such heavy missiles, the effect upon the target was no greater than with the shells fired from the 68-pounders. A salvo from the whole five guns fired against the target failed to penetrate through it, but a gap, six inches deep and 15 inches long, with three large cracks around it, was made, three of the five solid shot having struck in the same place. Since these experiments were made, round shot has been considered in England the most effective against iron plates.

Experiments have also been made with an Armstrong gun firing against Jones's system of angled plates. The gun used, fired cast iron balls 110 lbs. solid bolts, 7 inches in diameter and 12 inches in length. The charges used were 14 lbs. of powder. The angled plates were 4½ inches thick. Six of such bolts struck the target within a space of 21 inches by 12, and three within one inch of one another. The plate was driven in 3½ inches, upon a backing of pine, and was fractured, but not pierced. Such is all the practical information which we really have upon this subject. We think it deserves further attention. The best form of shot for penetrating iron plates, when set perpendicularly on wall-sided vessels, in horizontal curves as in round towers, or angled to deflect the shot upward or downward, can only be determined by experiments. The experiments which have already been made with shot fired against iron plates have been too few in number to settle this important question.

Plaster figures may be bronzed by first giving them several coats of size, and then applying bronze powder; also by applying bronze lacquer after they have been sized and have become dry.

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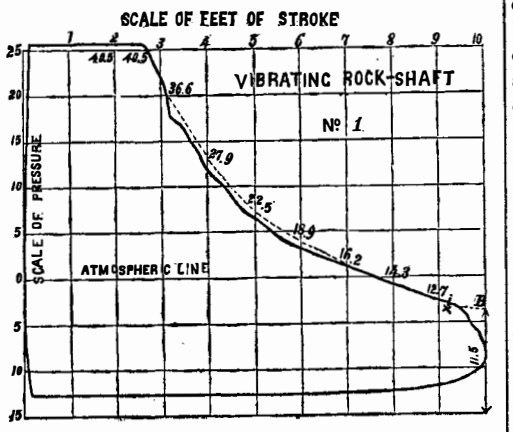
Correspondence

THE SCIENCE OF STEAM-INDICATOR CARDS.

Messrs. Editors :—On page No. 170, present volvume Scientific American, you report the result of your observation upon the engine of the steamer *Kiang-Tse*, and state that with the same fire that engine was made to revolve two turns a minute faster when using a valve gear which I applied, than when using one known as the "Winter cut-off." The statement is correct ; and on a former trial, made Feb. 22d, a similar result was shown, when the turns were higher and the ship lighter. On that occasion my indicator was able to give cards, as the steam was carried at about 26 lbs., whereas on the occasion when you were present the steam was carried above 35 lbs., and as my indicator was too short for that pressure we got no cards. I herewith send you copies of the cards taken on the 22d of February—the originals being in the possession of the Allaire Works, whose draftsman was sent on the trial trip, and who marked and preserved them. They account for the difference in revolutions, and afford a very beautiful illustration of the value of indicators both to owners and engineers, by showing the exact agreement between their indications and the results in revolutions which the engine produced. In no other instance that I know of has such an opportunity been afforded of comparing the theoretical indications of the indicator with the actual results ; since, in all cases of attempted comparison, there were elements to be compared which the indicator did not speak of, and which might have produced the difference in results even if the indicator had not shown any. But here it was the same engine, the same boilers, the same fires, the same indicator, and the only change was that the valves were worked first by one valve gear then by the other, in immediate succession. The revolutions, therefore, could not have been affected by any other cause than the one which varied, and how that one operated the indicator must tell. And this experiment takes the indicator out of the reach of the ignorant objection made by some that it does not tell the absolute truth ; since the point to be ascertained is the *relative* power produced from the relative quantities of steam used ; and it might be true enough that in neither case did the indicator tell the absolute truth, and yet no one could deny that its comparative indications were correct.

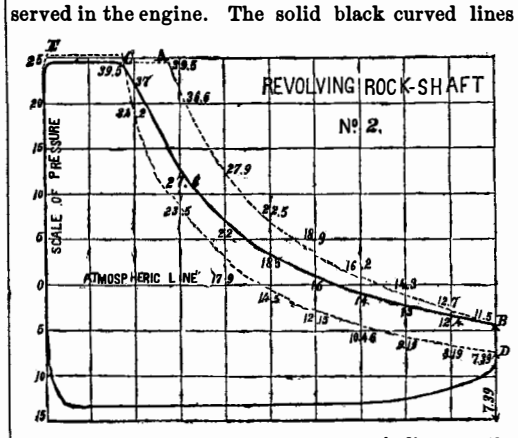
With these remarks I proceed to investigate the cards, and to explain the correct method of examining, and the true deductions which are to be drawn from indicator diagrams. The first fact to be ascertained in the working of a steam engine is how much steam does each stroke cost? When we know that we know how much fuel, which is money, each stroke costs. How then will you find out this quantity of steam by means of the cards? First, ascertain how much vacant space in the cylinder the steam has to fill which is not occupied by the piston in its stroke, called "clearance," and add it to the actual length of the stroke. In these cards that space is about 2.4 inches at each end ; the stroke is, therefore, 10.2 feet for steam, instead of 10 feet, which is all the piston motion there is. Secondly, measure the pressure of steam as the card shows it at the end of the stroke—in this case it was 11.5 lbs.—then multiply the length of the stroke divided into any units you choose, by the pressure in pounds, and you have a product by which to examine the card, and ascertain whether there was more or less steam at any other point than there was at the end of the stroke. Then assume any other distance on the card, from the beginning, less than the extreme length, and divide the product first obtained by that distance, including the clearance, and the quotient is the pressure of steam which the card ought to show at that point, according to Marriotte's law. Measure the card, and if it shows more, then try other points in the same way, and you will soon find where the most steam was, and how much it was.

The next step is, to find out what power you have got from this quantity of steam thus used ; and for that purpose a comparison must be instituted between the theoretical card and the actual one, and the difference between the two will be how much you have lost. The theoretical card is easily made : multiply the pressure of steam in the cylinder at the point where you have found the most steam to exist, by the length of stroke, including clearance, at that point, and you have a constant product. Divide this product by all other lengths of stroke, and you have the pressure of steam at all other points. Measure off on the card the pressures at the various distances you have used, as divisors, and connect them by a curve ; it will be the true curve of pressure by Marriotte's law, and any departure from it will be a loss of power practically. It is proper to say, however, that Marriotte's law is not strictly true, because there is more heat in higher than in lower steam, which neither Marriotte nor Watt had discovered ; and this fact makes another curve than the hyperbola the true one ; but at low rates of expansion this difference is quite



unimportant, and the analysis of the curve would be beyond the knowledge of the practical engineers who read this, and men of science know it already. In high rates of expansion, however, this difference is important, and its effect is to make high expansion more valuable than Mr. Watt or Marriotte supposed it to be.

Applying these principles to the two cards here shown and we have an indicated result, which accounts for much of the difference of revolutions observed in the engine. The solid black curved lines



are the cards actually made by the indicator; the dotted lines are true cards, which should be made according to Marriotte's law; the square lines are the divisions of length of stroke and pressure scales. Card No. 1 was made by my arrangement of valve gear, which involves a Sickles cut-off, and No. 2 by a revolving valve gear, on which Mr. Winter has made some alterations, not affecting its action upon steam, but only its cost or convenience, and which is now called—I presume from this circumstance—"Winter's cut-off." In No. 1 the exhaust valve opened at x, and the pressure fell off ; whereas in No. 2 the exhaust valve opened at the end of the stroke, and the pressure was maintained till then ; but by producing the pressure on the card, No. 1, from x to the end, at the same rate it was falling, we have the true quantity of steam which would have been in the cylinder at the end of the stroke, if the exhaust valve had not opened sooner. This final pressure is 11.5 lbs. in both cases, by measurement, thus showing that in both cases a cylinder-full of steam at 11.5 lbs. density was paid for in fuel by somebody, who, therefore, ought to know how much power he got for his steam. The cylinder and clearance in this case amount to 10.2 feet long ; we multiply the terminal pressure by 10.2 and the product is 117.3. Divide this product by 9.2 and then by 8.2, 7.2, 6.2, &c., and the quotients are the pressures of steam at each of these points of the stroke, as marked on the card. From this process results the dotted curve, A B, on both cards. But on card No. 1 the actual curve made by the indicator agrees with the dotted curve almost exactly, whereas in No. 2 it never approaches it, and the difference is as high as 9 lbs. of pressure to the square inch, at a point where pressure is valuable, as the piston is moving fast. The mean difference is about 21 per cent, after adding to the top of the card, No. 2, the area in dotted lines, C E, to bring up the boiler pressure to the same point in both cases, there having been a differenceof one pound of boiler pressure in fact.

But how false the card No. 2 is, is shown by the curve, C D. By the law of steam the person who pays for the coal is entitled to have his piston first driven by the boiler's pressure, unreduced by wire-drawing, and then to have it driven the rest of the stroke by the steam expanding, according to the law of Marriette, as modified by the discovery of Regnault. If he does not get these results he is paying for more coal than he should for the power he is obtaining; and the card ought to be brought up to these required conditions. In doing this you must take the point where expansion begins, and lay down the true curve to the end of the stroke, and you will then see how little steam you ought to exhaust. Apply that law to these cards and the curve begins at the point, C, in No. 2, and A in No. 1. In card No 1 it comes out at 11.5 lbs., agrees with the actual card, but in No. 2 it comes out at 7.39 lbs. as the amount of steam which ought to have been used by the engine at that stroke. But in fact it used 11.5 lbs. of steam, or 55 per cent more than 7.39 lbs., which is all it ought to have used. For this 55 per cent of steam the amount of power is produced, represented by the area, C B D, and which is about 14 per cent of the total pressure of the actual card ; so that a loss of about 41 per cent in fuel, when working at this rate of expansion, results from using a valve gear, which distorts the card so much. This same result may be reached by another method, thus : If the cut-off has been true from the point, C, which is 1.9 feet from the beginning, the ratio of expansion would have been 5.3 to 1. The power due to that ratio by Marriotte's law is 1 for boiler pressure, plus 1.668 for expansion, equaling 2.668 ; whereas cutting off at A, the ratio is 3.4 to 1 and the power 2.224, showing a loss of 20 per cent. But in No. 2 the steam used was enough for the lower rate, while the loss of power was about 21 per cent of that which, added to the loss of expansion, makes 41 per cent, false card.

These cards were taken, with numerous others, on the engineer's trial trip, in the presence of several engineers—No. 2 having been taken first. As I knew that engineers generally judge of the perfection of a card by its square corners, I handed No. 2 around, and asked the opinion of the party present. It was unanimously declared to be a first-rate card ; indeed it seems to be so to a person having a superficial knowledge of the subject. When I had obtained this opinion I said the card was false about 40 per cent, which drew forth the indignant denial of more than one. The person present who took most interest in the revolving valve gear declared that I might as well say 100 per cent and have done with it, so certain was he of the correctness of the card. The result of the analysis I have given will enable any person familiar with the subject to see how true was the estimate which practice enabled him to form, and all can see how uncertain a test is square corners on a card.

If by these suggestions I am enabled to induce owners of steamers, as well as engineers, to rely upon the indicator more than they have been used to do, and to insist upon having engines built which will conform to the laws of steam, I will have done the mercantile community a great service ; for it is perfectly certain that a departure from the true card costs fuel in the exact ratio of its error.

If those ignorant persons who assert that there is no benefit in working steam expansively beyond one quarter of the stroke will first procure an engine that will, when tight in all parts, and insulated by jackets and felt, make a true card, they will discover no difference between theory and practice ; but when they experiment with an engine which will not make a true card, it is simply absurd to deduce any laws of steam from it—the only logical deduction is that it is a poor steam engine, and the only honest advice to

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the owner, if fuel is an object, is to buy one which will make a true card. It is, no doubt true, that expansion is valueless when steam is wasted, as the card No. 2 shows, and this very engine will give as much economy with the piston following 7 feet as when cutting off where it does, when using the revolving valve gear; but this does not prove that expansion is not economical, but only that this kind of expansion is not economical.

EDWARD N. DICKERSON.

New York, March 21, 1862.

Geology of Michigan.

MESSRS. EDITORS:—In the article on the geology of Michigan, in the SCIENTIFIC AMERICAN of the 8th inst., there are two statements I think worthy of correction. The first, and most important, is, that there are no salt springs known between the State of Michigan and Salt Lake. I am informed, by a gentleman who has resided in the Territory of Nebraska, that there are numerous salt springs in that territory, some seventy-five or eighty miles northwest from Nebraska city, and not more than sixty miles due west from the Missouri river (about latitude 41), yielding water of great strength, and, when properly evaporated, salt of an excellent quality. The springs are numerous, scattered over a considerable district of country, and the supply of water abundant. The great drawback to their being extensively worked is a scarcity of fuel, as it is a prairie country, and coal has not yet been found convenient. The other statement I would correct is the assertion that Michigan is the only State in the Union that contains or furnishes coal, salt and gypsum. Our own State of Ohio also supplies these three valuable minerals in great abundance. The coal and salt are found on our southern border and the gypsum on the northern—there being large deposits of the latter mineral, of excellent quality, within fifteen miles of the city of Sandusky, which have been profitably worked for a number of years past. The coal and salt are found on the Ohio river, at and in the neighborhood of Pomeroy, Meigs county, and on the Muskingum river, near Zanesville.

The same gentleman from which I received the information about salt in Nebraska also states that salt and gypsum have been found in Iowa, nearly due east of the salt springs of Nebraska; so I think it not improbable all three of these minerals may yet be found in that young but flourishing State. The mineral resources of the West have scarcely yet begun to be developed. F.

Cincinnati, Ohio, March 14, 1862.

[We cheerfully accept the correction of our correspondent. The paragraph to which he refers needs but to be read in connection with that next succeeding to be understood as we designed it, though we should certainly have been more explicit if we had used the term "carboniferous formation," in both paragraphs. We were not ignorant of the plaster beds at Sandusky, in Ohio, nor of the same beds on the Desmoines, Iowa, nor of the salines in the great gypsum portion of the Great Plains, as described by Dr. Hayden and other geologists of the various exploring expeditions. All gypsum formations, when of sufficient thickness, have salines. We made the statement of salines in an economical view, and in this sense it holds good.—EDS.

Anchor Ice.

MESSRS. EDITORS:—The query of your correspondent "E F., Jr.," of Westerly, R. I., concerning anchor ice, arrested my attention, but as the answer did not fully satisfy me, I consulted the new American Cyclopedia, where Prof. Dewey explains the character of anchor ice on the supposition that the whole body of water is cooled below the freezing point, but under conditions of quietness opposed to the formation of ice. The substances at the bottom serve as points of congelation, like those introduced into saline solutions to cause crystallization to take place, and ice forms upon them. It is observed to gather in a clear cold night, when the surface of the water is not frozen, and its temperature is at the freezing point, and that of the air being still lower. The layers of ice are sometimes three inches thick, and as soon as they are detached from the bodies which hold them down they rise to the surface. I should like to hear some other opinion on the subject. A SUBSCRIBER.

Portland, Me., March 15, 1862.

Defence of the Secretary of the Navy.

MESSRS. EDITORS:—The SCIENTIFIC AMERICAN is devoted to the inculcation of truth and justice. You will therefore be glad to stand corrected with respect to your reflections upon the Naval Department of the government, with regard to the construction of armor-clad vessels. The writer desires to say that he has had peculiar opportunities of knowing all the facts in the case since the matter assumed any pressing public importance, which may be said to date at the fall of Fort Sumter. This subject did not fail to attract more than an ordinary degree of attention and solicitude upon the part of the Secretary of the Navy, and it is a matter of record, about which there can be no mistake that immediately on the assembling of the special session of Congress, in July last, the Secretary recommended the immediate passage of an act appropriating $1,500,000 for this purpose. At that time, and previously, it may be truthfully asserted that the public generally failed entirely to comprehend the scope of the rebellion, and the means necessary to put it down. As an evidence of this I need only point to the fact that, notwithstanding the repeated solicitations of the Secretary of the Navy, that immediate action upon the bill reported for constructing iron-clad vessels should be taken, the bill did not become a law till the 3d of August, and within three days of the adjournment of Congress. By a recent publication in the *National Intelligencer*, issuing from the Navy Department, you will see that the Secretary and his very able assistant, Capt. Fox, aided by the chief of the Bureau of Docks and Yards, Commodore Smith (than whom there is not a more efficient man, for his particular post, in the United States,) have rendered every possible facility in their power, to forward the vessels in course of construction, and if all has not been accomplished that an impatient public now desire, there is certainly no just ground of complaint against the Secretary of the Navy, or of any of the officers immediately concerned in this enterprise. The affair at Hampton Roads is of great national importance, and this not alone with respect to the most available means of harbor and coast defence. It has opened the eyes of Congress, as well as that the of people to the importance of the immediate construction of iron-clad vessels, and it may be doubted whether without so costly a disaster Congress could have been induced to passs the $15,000,000 appropriation bill for the further construction of this class of vessels, then lying upon their tables. Now that they have done so, there is no room to doubt that the Secretary of the Navy will act in the matter with the same degree of promptness that characterized his action in the former case.

It is proper to add that the writer makes these suggestions wholly upon his own responsibility and without consultation or advice with any one, but from his own intimate knowledge of the facts in the case, and trusts that the editors of the SCIENTIFIC AMERICAN will give them publicity in their columns, as an act of justice to a much-abused, but, in his opinion, highly-deserving public officer. W. L. B.

Washington, March 19, 1862.

Suggestions for a Pilot House.

MESSRS. EDITORS:—From the letter of the Chief Engineer of the *Monitor*, published in the last number of the SCIENTIFIC AMERICAN, it appears that the pilot house proved to be the only vulnerable point of that wonderful vessel.

Allow me to suggest, through your valuable paper, an improvement in the construction of pilot houses for iron-clad vessels. It is evident that the best possible form for such structures, would be that which (having a given hight) combined the smallest amount of surface and material, with the greatest deflectional power.

Of all the regular figures, it appears to me that a "paraboloid of revolution" (having a certain length of parameter and axis perpendicular to the deck) would most nearly satisfy these requirements. It could be formed of large, horizontal iron rings, grooved and doweled together, the cap being a heavy piece of iron which should not only be grooved into its subjacent ring, but have also strong stays leading down near the inner sides of the house, to form attachments in the hold of the vessel.

Such a form of house would very readily deflect balls striking it in a nearly horizontal direction, and effectually resist the uplifting force of the ball. While balls fired from an elevation would simply press the rings together and render their separation more improbable. The great beauty of a pilot house made as suggested is, that the chances of striking it in the direction of a normal are almost as 1 to 1,000.

This subject is highly important, and I trust that such improvements will be made as will render the pilot houses of the vessels recently ordered by Congress perfectly impregnable. W. S. A.

Troy, N. Y., March, 1862.

Water Gas---Letter from Professor Sanders.

MESSRS. EDITORS:—In your issue dated Saturday, March 29th, you asked the question, "what has become of Sanders's water gas?" You likewise said you predicted its failure, &c. Although the past year has not been very favorable for the progress of any new enterprise, still the water gas thrived as rapidly as could be expected. The city of Aurora, Indiana, has been lighted with this gas for the last eighteen months and the town of Marlboro', Mass., for the last six months. During that time, it would be expected that some estimate should be arrived at respecting the cost of the water gas. As I have not been at either of these towns I cannot speak from actual observation, but from letters which I have received from the engineer of those works, the cost and quality of the water gas have proved highly satisfactory. Mr. Severin, who got up the water gas works at Aurora, Indiana, informs me in a recent letter that since they have got to making superheated steam, and crude coal oil for the carbonizer of the water constituents, the fact is demonstrated beyond dispute that the water gas of a superior quality can be made at a cost as low as twenty-five cents the thousand cubic feet. Mr. Cresson informs us in his late report of the progress, &c., of coal gas at the Philadelphia, works that the cost of coal gas there is $1 20 per thousand feet. As photometric experiments have demonstrated that the water gas gives one-third more light than ordinary coal gas the public will soon have it made clear to them which gas it is for their interest to patronize. Patents for the water gas have been procured in the principal kingdoms of Europe. A wealthy company have taken hold of the water gas in London, and a large city near there is now being prepared for lighting with the gas. Mr. Severin, of Aurora, is now on his way to England for the purpose of superintending the erection of the works there. I must also state that the town of Laconia, New Hampshire, a place containing large manufactories, is now lighted with the water gas.

Do these facts seem to prove your prediction true that the water gas is a failure? Ere the present year —so pregnant of great events—has gone by, demonstrations of a gigantic nature, nearer hand, will disabuse you of the delusion you have entertained, that the water gas is a failure. And in conclusion, gentlemen, let me assure you that the company at Philadelphia have not for a moment entertained the belief that your apparent opposition to the water gas originated in any other motive than that of exposing what you conceived to be a humbug; and they anticipate that the independent candor that actuated your former articles will induce you soon to do justice to a discovery which, despite the unscrupulous efforts of interested companies, will prove of the greatest benefit to the people. J. MILTON SANDERS.

New York, March 26, 1862.

[We assure Professor Sanders that it will afford us the greatest pleasure to announce the success of his water gas. We are tired of the old monopolies, and want new, cheap and useful gas.—EDS.

To Make Superior Vinegar and Pickles.

MESSRS. EDITORS:—The following receipt will be valuable to many readers of the SCIENTIFIC AMERICAN:—To one gallon of soft water add a pint of sugar, or sorghum molasses, stir all well, and then add nearly a gallon of fresh and ripe tomatoes. Now set the vessel aside, and in a few days you will have the sourest pickles I ever tasted, and nearly the best vinegar. THOMAS ARMOR.

THE Russians have adopted steel barrels for their army rifles. No less than 250,000 of them are being made by Krupp, at Eissen, Prussia. They are to be made solid, then bored out.

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Cost of Steam and Water Power.

In a pamphlet lately published by citizens of Beaver county, Pa., memorializing Congress for the erection a National Armory at Brighton, Pa., we find some of useful statistics respecting the comparative cost of steam and water power. They are as follows :—

The city of Philadelphia is supplied with water by some four distinct Water Works, the chief of which are Fairmount Water Works, by water power, and the Schuylkill and the Delaware Water by steam power—anthracite coal being the fuel used.

The city of Pittsburgh is supplied with water by steam power, and so also is the city of Allegheny—their fuel being bituminous coal.

From the published reports made last year by the Superintendent of those Works to their respective city authorities are derived the facts as stated; and from the same some comparisons and estimates are made worthy of note.

At Fairmount Water Works, Philadelphia, 1860, the cost of raising 1,000,000 gallons of water one foot high, by water power, was, not including repairs or interest upon first cost of machinery, &c., .009 of one cent. There was raised in the reservoirs, 95 and 111 feet high, 3,390,271,757 gallons of water, which yielded the city a revenue of $250,265. The actual current running expenses for raising this water, yielding this large revenue, was 2,949 27—being about one-ninetieth of the revenue.

At Pittsburgh City Water Works, steam power, 1860, the cost of raising 1,000,000 gallons of water, one foot high, by steam power, was at the Lower Works, not including repairs or interest upon first cost, 6 cents and three mills. At the Upper Works the cost of raising 1,000,000 gallons of water one foot high was 7 cents 6 mills and over.

Pittsburgh City Water Works, three steam engines, raised in 1860, 1,360,134,383 gallons of water, at a current running expense of $18,023 81, and from which the city derived a revenue of $71,145 34. The actual current running expense of raising the water from which was derived this amount of revenue was $17,551 10. About one-fourth the amount of revenue.

At Allegheny City Water Works, steam power, 1860, the cost of raising 1,000,000 gallons of water one oot high was, not including repairs or interest on first cost, nearly 7 cents and 6 mills. The assessment of water in this city, for 1860, was $43,796 71. The actual current running cost of raising the water $4,309 51—being about one-tenth of the assessment.

The actual current running cost of raising the water for Pittsburgh and Alleghany cities—four steam engines—about one-half time, was $22,333 32; which at six per cent per annum is the interest upon $372,-200.

The actual current running cost of raising 3,390,-271,757 gallons water, by water power, at Fairmount, for 1860, was, including pumps, $2,949 27.

The cost of raising this same amount of water the same hight, say only 105 feet, at the cost raising 1,000,000 gallons at Pittsburgh and Allegheny, by steam power would be $27,054, making a difference between the cost of steam and water power in raising the same amount of water an equal hight, of $24,-105; and that while the engines were working half the time, or little more; the difference in the cost of the same work being the interest, at 6 per cent per annum, upon more than $400,000.

At Philadelphia Delaware Water Works, steam power, the cost of raising 1,000,000 gallons of water one foot high, 1860, was, not including repairs or interest on first cost, 11 cents and 8 mills.

At Philadelphia Schuylkill Water Works, steam power, the cost of raising 1,000,000 gallons of water one foot high, 1860, was, not including repairs or interest on first cost, 8 cents and 2 mills.

The actual running current expenses of raising 115 feet high 2,643,736,620 gallons of water, and which gave a revenue of $174,319, was, for 1860, $21,381 40—a little more than one-eighth of the revenue.

The difference being $24,105 in favor of water power at Fairmount, Philadelphia and against the steam power at Pittsburgh (and is much greater between the water power and steam power at Philadelphia, in raising the same amount of water the same distance), and would be an additional cost of two dollars per gun if only 12,000 guns were made a year, or of one dollar per gun greater cost if 25,000 guns a year were made. The cost of coal consumed at the Upper Works of the Pittsburgh Water Works was last year a fraction more than 4 cents per bushel. The cost of coal consumed at the Lower Works was for same time per bushel 4 cents 5.7 mills.

The cost of coal consumed at the Allegheny City Water Works, called "slack," was, in same time, 2 cents 87-100 per bushel.

The cost of coal to the Government at the Arsenal at Pittsburgh is 4¾ cents.

The water power at Fairmount worked night and day.

The Pittsburgh steam engines worked about twelve and a half hours—little more than half time. Allegheny City the same.

Running water power night and day adds no more to the cost than if working half time, while you double the cost by so working the steam engines.

The current running expenses of $2,949 27, charged to power at Fairmount, includes the attention and expense of keeping in order, oil for, &c., of the pumps.

Donald McKay on our Ships-of-War.

The Boston *Commercial Bulletin* publishes a long letter from Mr. McKay on the subject of iron-clad ships, which we should be pleased to copy in full were it not for the pressure on our columns. We make the following extracts—they deserve wide-spread circulation among our people :—

The truth should not be hidden, however unpalatable it may be to the naval constructors; the whole truth must be spoken out in every respect to save our country from ruin. It cannot be denied any longer that our navy (in what regards shape and performance of ships) is far behind those of most of the other naval powers. The slow steaming qualities of our frigates are a disgrace to our country. The most of our other classes of screw-steam sloops and gunboats get beaten whenever there is a trial of speed with similar-sized men-of-war ships of other nations. What are the causes of this marked inferiority of speed in our men-of-war ships, while our merchant ships of all classes (steam and sail) gather laurels where ever they have to run a trial of speed with similar ships of other nations?

When about 13 years ago the discovery of the California gold mines produced a demand for a class of sailing ships of high speed, our merchant builders readily complied with the demand, and turned out in short time a fleet of clipper ships never surpassed in speed by those of any other nation.

When our merchant builders were called upon to produce packet steamers of superior speed to those of the celebrated Cunard line, the appearance of such vessels as the *Arctic*, *Vanderbilt* and *Adriatic* was marked as so many triumphs of American naval architecture.

When we compare this uninterrupted line of success of our merchant builders with the little and slow progress that is observable in the qualities of the new ships which are added every year to our navy, the most unprejudiced mind must become convinced that some radical change becomes necessary in the organization of our bureau of naval construction. Among our naval constructors are many of whom our navy might be proud, and who are an ornament to their profession; but are they ever allowed to give a proof of their skill, and to act according to their own best judgment?

They are not.

Who, then, is answerable that so little progress has been made in the production of efficient, fast men-of-war ships?

I answer—Nobody else than the chief of our bureau of naval construction.

As he has never allowed any of the other naval constructors to compete with him on a fair and open field, he has made himself responsible for the production of all the slow coaches of which our navy has to be ashamed.

Our frigates of the *Merrimac* class are, without doubt, powerful vessels in artillery; but they are too slow to overtake a weaker or about equally-powerful adversary, and too slow to escape before a superior force. Seven to eight knots is all that these frigates can average under the most faverable circumstances, while English and French frigates, of the same class, average eleven to twelve knots per hour. In nearly all the other classes of ships composing our navy, is a similar inferiority of speed observable.

It might be argued that our private builders had never given any proof of their capability to produce a superior class of men-of-war ships, but (unfair though such reasoning would be) it happens that two of our body, Mr. W. H. Webb and Mr. J. A. Westervelt, have shown—the former by the production of the splendid Russian frigate *General Admiral*; the other by the construction of the superior United States steam-sloop *Brooklyn*—what a superior class of men-of-war ships our country might possess, if our government had applied far aid to the right class of men. The chief of oar bvreau of naval construction has entirely failed to produce, by his designs, a frigate that is at all comparable for speed, beauty of form and general seaworthiness to the *General Admiral*; and as long as he will have the vndivided power and autocratic rule of our shipbuilding department, the country will look in vain for timely appearance of a superior class of men-of-war ships in our navy.

My former letters have repeatedly advocated, for over two years, the necessity for iron-clad ships. There is no lack of material, for we have better iron and wood for shipbuilding than any other nation in the world, and in any quantity the government may want; also, as skillful mechanics as the world can boast of.

NEW YORK COURT OF COMMON PLEAS.

Liability of Telegraph Companies.

Bryant and others vs. American Telegraph Company.—Before Hon. J. R. Brady, J.—A law suit of novel character, involving questions of much interest to all who have occasion to transmit messages by telegraph, has just been tried in the Court of Common Pleas of this city last week.

The plaintiffs were Jonathan P. Bryant and others, and the defendants were the American Telegraph Company.

The facts of the case were, that on the 24th of February, 1860, the plaintiffs were creditors, to the amount of twelve thousand dollars, of a certain firm doing business in New York, one of the members of which resided and owned property in the State of Rhode Island. By the laws of Rhode Island, property of a debtor can be attached by his creditor, only when the debtor is absent from the State, no matter for how brief a period. On the day named, the plaintiffs learned that the firm which was their debtor, was in failing circumstances, and that the Rhode Island partner was then in New York intending to return to his home that evening by the Stonington line of steamboats and railroad. Desiring to attach his property in Rhode Island, and there not being time enough to direct an attachment by mail, the plaintiffs, after consulting counsel, determined to telegraph to a lawyer in Rhode Island, to make the proposed attachment. It was generally understood that the Stonington train reached the Rhode Island line in the vicinity of one hour after midnight, and as no attachment could be made after the returning debtor had crossed the line, it was necessary that the telegraphic dispatch should be forwarded and delivered at once, so as to allow time to levy the attachment after the message was received in Rhode Island and before the train reached the line. The plaintiffs explained these facts to the agent of the telegraph company, pointed out to him the importance of the message, and delivered the dispatch to him for transmission, upon the assurance on the part of the agent, that it should be forwarded and delivered at its destination, *immediately*. The plaintiffs paid the full price charged for the message and tendered any extra compensation required to insure the immediate delivery of the dispatch.

The message was left with the defendants at a few minutes before nine o'clock in the evening; the time necessary to transmit it to Rhode Island was less than five minutes, and the distance from the office of the Company to which the dispatch was sent in Rhode Island, to the residence of the lawyer to whom it was addressed, could be easily passed over in two or three minutes.

But the defendants neglected to transmit and deliver the message, until midnight. It was then too near the time of the arrival of the debtor at the State line, for the lawyer in Rhode Island to make the attachment. Two days after, a mortgage in favor of another creditor was placed upon record covering the full value of the property the plaintiffs had sought to attach, and thus by the delay of the defendants, they were unable to secure their debt of twelve thousand dollars.

Under these circumstances, the present action was, by advice of their counsel, brought against the telegraph Company for damages for the loss occasioned by the delay in forwarding and delivering the message.

The plantiffs proved that the defendants agreed to transmit and deliver their dispatch immediately; that they neglected to do so; that after it was delivered there was not time to make the attachment, and they also proved that six months after the message was sent, the debtor's property which it was attempted to attach, sold for more than sufficient to pay their claim in full, and that they had tried all other possible means to secure payment of their debt without success.

The defendants, notwithstanding, asked that the plaintiffs be nonsuited, which the Court refused. The defendants then put in their testimony, and contended that they were not bound to deliver the dispatch any more speedily than they did, and that the reason it was not delivered earlier was that they were engaged in transmitting matter for newspapers which could not be interrupted. They further denied that they were liable, because the message had not been repeated, that is, sent twice, to insure accuracy.

They relied chiefly, however, upon the ground that the plaintiffs' attorney in Rhode Island was bound to try to make the attachment, though the dispatch did not reach him till midnight, and that because he did not, the plaintiffs were guilty of negligence which excused that of the defendants.

After argument on both sides, the Court charged the jury that upon the evidence the defendants were bound to have forwarded and delivered the message *at once*; that the fact that they were sending matter for newspapers did not authorize them to sacrifice the plaintiffs rights, it not being such a paramount duty as would, in law, justify their delaying the plaintiffs; that they could not lawfully restrict their liability because the message was not repeated, as they claimed, and that it did not relieve them from the consequences of their gross negligence that the plaintiffs' attorney did not attempt to make the attachment, he having, in good faith, in the exercise of his judgment, satisfied himself that it could not be done in the time remaining when he received the dispatch.

The Court then left it to the jury to find, as matter of fact, whether after the plaintiffs' attorney in Rhode Island received the message, the attachment could have been made, directing them, if they found in the negative, to bring in a verdict for the plaintiffs.

After a short absence, the jury found for the plaintiffs for the full amount claimed, with interest, making in the whole the sum of $13,145 77, besides costs.

The Court remarked to the jury in the course of the charge, that this was the first case of the kind ever tried in the State of New York, and that it was not aware that such a case had ever before been tried any where, and stated that it was one of great importance to the public.

For plaintiffs, Messrs. B. and S. D. Cozzens; for defendants, Messrs. Goodman and Jesup.

There are 1,880 miles of railway in Canada. The average speed of express trains upon them is 24.3 miler per hour.

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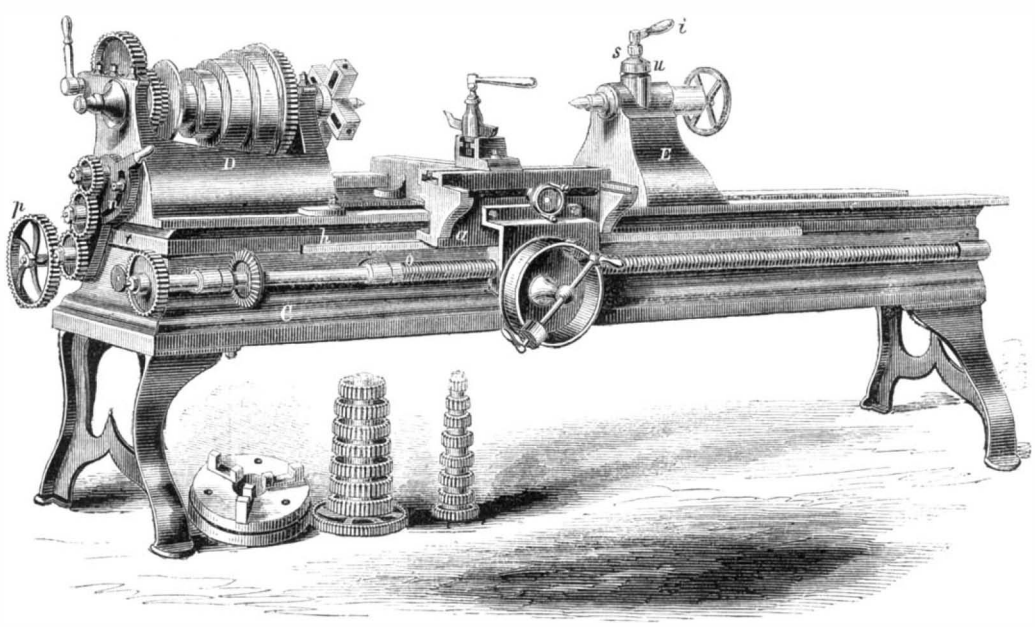
Improved Engine Lathe.

It is well known to machinists that the ways of engine lathes being on the upper side of the frame, are very apt to collect dust and sand, and consequently soon to become so worn as to impair the working of the machine. The accompanying engraving represents a lathe which is so constructed as to obviate this difficulty, and which has some other improvements that will be understood from the following description. The frame, C, has flanges extending horizontally from its upper edge to protect from dust the ways, *h*, which are underneath the flanges; the rest, *a*, having feet extending inward so as to rest upon the ways. The space between the flanges and the feet is made of suitable extent to receive the gib, and the top of the rest is constructed to receive a table for use in boring boxes, cylinders, &c. The rest is fed to the work by the feed screw, *o*, which is drawn by cone pulleys and gears near the end. The screw, *p*, is the lead screw used in cutting screws. The yoke, *n*, holds the intermediate gears, being so constructed as to swing into *p* or *o*. By using the sixteen gears shown on the floor 312 different run of screws may be cut.

The tail block, E, differs from those in common use only in the mode of fastening. The screw, *s*, passes through the nut, *u*, which has two rods running down into the cross bar, so that by turning the screw both sides of the block are made tight or loose at the same time. For tightening the spindle independently of the block, the screw, *s*, is made hollow, and a steel thimble passes through it and rests on the top of the tail block, so that by turning the hand nut, *i*, the spindle is tightened.

To enable the head block, D, to swing when taper boring is to be done, this block is secured to the bed by a trunnion, which has its box in the bed; the block being secured in the desired position by the bolts, *t*.

For the purchase of these lathes, or for the right to use the protected ways and the tail block, or for any further information in relation to the matter, inquiries may be addressed to the inventor, A. S. Walbridge, or to the manufacturer, C. C. Whittelsey, both at Malone, N. Y.



WALBRIDGE'S ENGINE LATHE.

Chemical Trick with Silver Ore.

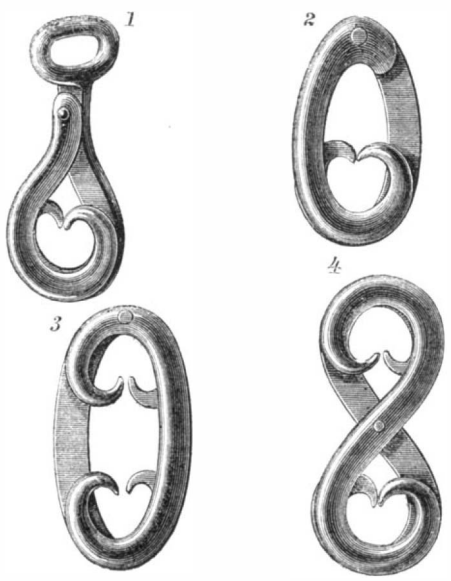
The *Druggist's Circular and Chemical Gazette* relates the following shrewd but unprincipled scientific operation. It says:—Some years ago a silver mining company was got up here on the strength of the immense richness of ores brought from Central America, or Mexico. When the first installment of funds had been used up, a meeting of the stockholders was had, at which the managing chemist was to demonstrate by actual experiment the richness of some of the ores. Unfortunately he was unable to get rich ores (for in the company's mines there were none), so that at the meeting he had to add to the solution of some other silver ore in acid, a clear and concentrated solution of nitrate of silver, which showed a considerable amount of silver when the solution was precipitated with salt, and of course satisfied the stockholders.

PHOTOGRAPHING IN NATURAL COLORS.—M. Niepce de Saint Victor, in continuing his researches upon heliochromy, has succeeded in giving greater permanence to the colors obtained, chiefly by the employment of a bath of chloride of lead and dextrine. In diffused light, the colored images obtained will stand ten or twelve hours. This is certainly a step in advance toward the solution of this very interesting problem; and, as M. Niepce remarks, if it be not yet completely solved, it affords encouragement to hope that it may be ere long.

BEAGLE'S SAFETY HOOKS.

There are a great many situations in which it would be extremely desirable to have a hook that would be perfectly secure from loosing its hold; and such a hook is illustrated in the accompanying engravings.

It is formed of two semicylindrical pieces of wrought iron, bent into the proper form and connected by a rivet so that they may be opened and closed, with curved projections on both parts extending inward and meeting, as shown. The hooks may be made of different forms to suit the various purposes for which they may be required. In the engraving, four forms are represented. No 1 is suitable for a harness hook, or to attach a watch to its chain. It may also be used to advantage on pulley blocks of vessels in place of the hooks now in use which have to be tied together, to make them secure. No. 2 is for connecting the links of a broken chain. Nos. 3 and 4 are for attaching a single tree to a double tree or plough. No. 4 requires to be attached or detached at both ends at the same time, while No. 3 may be detached



at one end only and remain attached at the other end to the single tree.

It will be seen that no draft or strain is required to insure a connection.

The patent for this invention was granted April 9, 1861, and further information in relation to it may be obtained by addressing the inventor, Henry Beagle, Jr., at 410 North Fifth street, Philadelphia.

IN order to make blister steel in the common way, wrought-iron bars are packed with powdered charcoal in large fire-brick chests, and then exposed to a white heat for several days. The time required for heating and cooling extends from fifteen to twenty days.

PHOTOGRAPH ALBUMS.

When the war commenced, men who were engaged in selling flour, beef and other necessaries, supposed that their trade would not be much affected, while all of those who were administering to the demand for luxuries anticipated a very serious curtailment, if not an utter destruction of their business. This anticipation was experienced in the highest degree in all departments of the fine arts, as the love of the beautiful and ornamental is the first feeling to be sacrificed to more inexorable desires. But in one instance these gloomy forebodings have been most signally falsified. Never since Daguerre succeeded in making the first sun picture, have daguerreotypists or photographers been so overwhelmed with business as they are at the present time. The fashion of having one's likeness photographed upon his visiting card, has been modified into the custom of distributing dozens of small full-length portraits among mutual friends, and these are kept in handsome books made with thick leaves for the purpose, and called photographic albums. Every young lady now expects to receive one of these books from some relative, lover or friend, and then she begins to besiege all of her acquaintances for photographs of their persons with which to form her collection. Sometimes the grandfather and grandmother occupy the honored place of the first pages, while father, mother, brothers and sisters, uncles, aunts and cousins complete the collection and constitute the most truthful, beautiful and perfect gallery of family portraits. In other cases the school-girl acquaintainces fill the pages in all varieties of smooth cheeks, soft eyes and carefully dressed hair, the collection being spiced with an occasional curling mustache or well-brushed pair of whiskers.

This fashion having become the rage, the photographic galleries are completely overrun with demands for the album pictures. One negative is taken from the sitter, and then six, eight, twelve or more positives are printed from it according to the desire of the customer. In all of the popular galleries in this city, crowds of persons are constantly waiting for their turns, and the proprietors are reaping a rich harvest. The same prosperity is enjoyed by the profession in other places, and from the receipt of some of the little pictures from officers beyond the Potomac, we discover that traveling photographers are visiting the army for the purpose of enabling the soldiers to comply with the all-prevailing fashion.

So extensive has become the demand for photograph albums that patents have begun to be taken for improvements in their manufacture. In the list of patent claims on page 189 of our current volume will be found the claim of the first patent that we have noticed in this new art, and which was granted to J. F. Tapley, of Springfield, Mass. The invention is used by Messrs. Samuel Bowles & Co., of Springfield, Mass., in their extensive manufacture of photograph albums, and they say that it very materially perfects, simplifies and cheapens the manufacture. We believe that the American Photograph Album made by them is a better article than any that is imported, and that it is furnished at a lower price. The samples of their work we have seen are excellent.

A RATHER poor quality of ink can be made with logwood, bichromate of potash and a little gum arabic. One ounce of the bichromate of potash will suffice for three pounds of the extract of logwood; dissolved in hot water this will make three gallons of ink.

THE total cost of the frigate *Warrior*, before being ready for sea, was £354.885—about $1,774,000.

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VOL. VI. NO. 14.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, APRIL 5, 1862.

WHAT CAN BE DONE FOR INVENTORS.—ADVICE GRATIS AND ADVICE FOR PAY.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

No. 37 Park-row, New York.

DEFENCE OF THE SECRETARY OF THE NAVY.

We publish on another page a communication from a correspondent in Washington in defence of the action of the Secretary of the Navy in reference to the construction of iron-clad war vessels. In discussing this subject we have had no intention to do injustice to the Secretary. We have no unkind feeling toward him or any other person connected with his department, and we are perfectly willing to believe that he has done his whole duty. Nevertheless there has been great neglect somewhere, and the blame ought to fall where it belongs. It was said in our last number that the Secretary had been deceived by the ignorance of leading naval architects upon whom he had relied. This is probable; and yet we do not hear that he has discharged a single one of them. It is more and more evident to us that there are bad advisers connected with the Navy Department.

The charge of our correspondent that Congress has been at fault in this matter, is also sadly true. Congress has done little or nothing since the war broke out to strengthen either the military or naval power. Its legislation has been dragging along in a most shameful manner and to very little purpose. Members have poured forth their bitterness upon leading officers in the army, which has promoted disorganization and trouble, while they themselves have been sadly behind the energy and devotion of the people.

THE MANAGEMENT OF TELEGRAPHS.

We publish in another column the report of a recent suit-at-law, in this city, to recover damages occasioned by the failure of a Telegraph Company to transmit a message in proper season. We are sorry that the Telegraph Company are likely to suffer so extensively for an error apparently so slight. At the same time, if the result of this suit shall have a tendency to infuse greater care and more promptness in the transmission of dispatches, then we shall regard the present heavy verdict as a benefit both to the interests of the Company and to the public.

We are glad that the judge put aside, in so summary a manner, the flimsy plea set up by the Telegraph Company, that they were not responsible, because the plaintiff *did not have his message repeated*. This *repetition* business has always appeared to us like a dodge to extort money on the one hand; while, on the other, it seemed intended to serve as a screen behind which the Company may run, to hide itself from the consequences of its own gross neglect.

A case was decided some time ago in another State, we believe, in which the judge held, in effect, that there was something so difficult and peculiar in the working of Telegraphs, from other arts and businesses, and so difficult was it to send messages correctly, that the Company ought not to be liable for damages, unless the sender had paid the repetition fee as demanded. In other words, the Company were not to be held liable, unless the sender paid to have the same work done twice. It struck us, at the time, that this judge knew very little of the state of the art of Telegraphy, or he would have arrived at a different conclusion.

The truth is that the present system of Telegraphing is just as plain and simple as any of the arts that men practice. There is no more difficulty in writing messages correctly than there is penning an account or copying a letter properly. If the message is written correctly by the operator at the start, it cannot possibly go wrong over the wires. The skill required in Telegraphing is of a very ordinary nature. It is a labor analogous to that of writing with a common pen. In the one case, we use ink; in the other, no ink is required; but in both a given set of letters or signals are to be combined by means of an instrument directed by the hand of the writer. Whether the copy thus made is correct or not depends upon the attention given to the business by the operator. If he is careless and stupid of course mistakes will be made; and a Telegraph Company should expect to suffer if it employs "blunderheads" to conduct its affairs.

The printer, after his types are set, takes a "proof" and reads it by the copy, to correct all errors before the matter is transmitted to the public. We should say that the printer who sent off his work without correcting his errors, was lacking in common sense. But it is far easier for the Telegrapher to take a "proof" of the message he is sending, than for the printer to prove his types. The Telegrapher may take a copy simultaneously with the act of writing the message, and thus instantly compare it with the original. But the printer must place the types upon a galley, lock them up, roll their faces with ink, prepare dampened paper, and then resort to the aid of the printing press to obtain an impression.

The utility of the Telegraph is due to its superior speed in the transmission of intelligence; and it has proved itself to be a vehicle of marvelous value and utility to mankind. But so clumsily is the business of sending and receiving messages conducted, in many offices, that the mails often prove to be the most speedy means of communication; and many an individual has had occasion to curse the hour that he ever entrusted his message to the Telegraph.

We live in hope that the time will come when Telegraph Companies will be more fully alive than they now are to the importance of using *the utmost dispatch and the most faithful accuracy*.

MR. M'KAY'S LETTER ON IRON-PLATED SHIPS.

On another page will be found portions of a letter from Donald McKay, Esq., on the subject of iron-plated vessels. As the writer was the pioneer in the construction of clipper ships, and as he is one of the most eminent and successful shipbuilders in the world, he must certainly be regarded as the very highest authority and his letter will doubtless be read with great interest. Receiving his statements and opinions with the highest respect, we cannot but regard one of the positions in this letter as unsound. He insists that we ought to have constructed vessels like *La Gloire* or the *Warrior*, instead of inviting plans from the people. Speaking of the course adopted in expending the $1,500,000 appropriated by Congress, he says:—

> Under the present urgent circumstances no time ought to have been lost by trying costly experiments for the sake of satisfying ambitious inventors; but we ought to have used the experience of other maritime nations as a firm base to operate and improve upon. If this matter had been rightly conducted since June last, we might have had, by this time at least, a fleet of twenty serviceable iron-cased ships nearly completed, instead of inviting only now for tenders to build the same.

Now it seems to us that the experience of other maritime nations affords by no means a firm base for our operations. The art of building iron-plated ships is in its infancy. In the intelligent paper on the subject, read before the British Association by Mr. Reid, it was stated that in all the costly experiments to test the effect of shot on armor plates, no target has yet been constructed to represent the sides of the *Warrior*, as such a target would cost $200,000. And it is well known that no missile has been tried in England possessing one-half the battering power of a spherical shot from a 11-inch Dahlgren gun.

Had the Navy Department undertaken last August to construct a vessel like the *Warrior*, the huge frame would be now standing on the stocks, with a prospect of being finished in the latter part of 1863, and the destructive course of the *Merrimac* would have gone on unchecked.

We trust that the course of the government in calling the attention of the inventors of the country to the infant art of constructing iron-plated ships—a course which has been so signally vindicated by the results of the first essay—will be continued. New developments of the very highest importance are constantly being made, both in Europe and this country. On very good authority both *La Gloire* and the *Warrior* have been pronounced failures, and even the London *Times* says that the mode of fastening the armor plates to the English ship must be abandoned. The course of the *Merrimac* has very recently demonstrated the tremendous efficiency of steamers when employed as rams, and there can be no doubt that a prow might be attached to a swift and invulnerable vessel that would pierce the *Warrior* below her iron plates and send her to the bottom in ten minutes.

The whole subject is open to discussion, experiment and invention, and let us have all suggestions which we can possibly obtain before we follow the questionable examples of England and France.

Pratt's Coal Sifter.

George Pratt, of Boston, Mass., has invented a very convenient and efficient ash sifter, and he is anxious to dispose of the patent to some enterprising party. The sifter consists of a circular cast-iron rim to fit the top of a barrel, with a sieve hung in it so as to have a horizontal vibrating motion; a cover closing the whole to prevent the escape of ashes, and a handle projecting from one side for shaking the sieve. Mr. Pratt may be addressed at Boston, care of Messrs. Chickering & Sons.

BOOTS AND SHOES.—Of the Boston boot and shoe trade, the *Reporter* says, there is a very satisfactory business doing in that market, and sales are made at good rates, and for cash or short time. Buyers from the large western cities have now about done purchasing; but the interior trade is well represented, and the aggregate requirements make up a fair weekly sum total of sales. The total shipments by rail from Boston the last week have been 11,250 cases. There were no shipments by sea.

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LATE EXPERIMENTS WITH IRON PLATING.

A resolution has just been introduced into Congress to the effect that $50,000 be appropriated for making experiments with shot and iron plates intended for war vessels. To prevent this money from being uselessly squandered, we will present some useful information on this subject. As stated in another column, a target representing a section of the *Warrior* was tested in October last at Shoeburyness, England, and it withstood the battering of the most powerful artillery to the satisfaction of all present. The target was composed of iron plates 4½ inches thick, backed with 18 inches in thickness of teak, and an inner iron plating, ⅝ of an inch in thickness. In the same place another most important experiment was made on the 4th of March last. The target was of the same size as before, viz., 20 by 10 feet; the plates were of the same quality and thickness, and so was the inner plate, but no teak backing was used. The British government had appointed a special committee on iron plates, of which William Fairbairn, F. R. S., was a member, and this target was made and tested at their request. It was supposed by a number of iron manufacturers and engineers that if iron braces were used behind the plates, instead of the teak in the target, it would resist shot in a superior manner, and it was to test the correctness of this supposition the experiment was made. Both targets were about the same weight, as the iron braces which replaced the teak were equal in weight to the wooden planking. The target was placed at 2,000 yards distance, and the battery was the same as on the previous occasion, and consisted of three 100-pounder Armstrong guns, firing 104-lb. bolts, and two 68-pounder smooth bores, firing round shot and shell. Six rounds of these five guns were fired, and the target was completely demolished. At the first round, which was fired with shells filled with sand, eight of the fastening bolts were broken off as clean as if they had been cut through with a chisel. At the second round the iron framing behind the plates was fractured, and nearly all the fastenings became loose. During the succeeding four rounds the shot crushed through between the joints and smashed the inner plating so that the target was a complete wreck with one-third of the number of shots which the former target successfully withstood at the previous trial, The Lords of the Admiralty and a great number of naval officers, iron-plate manufacturers, engineers and ship builders were present, and most of them were surprised at the result. The London *Mechanics' Magazine* says:—"The experiment has created intense interest in the shipbuilding and engineering world as well as in official quarters. The whole question as to an effective system of armor plating is thrown open, and it is felt on all sides that nothing but a series of experiments on a suitable scale can determine the best method."

This experiment has clearly solved one question of great importance, namely, the destructive effects of vibration on iron plates fitted to an inner-skin plate without a proper backing. This is a most valuable lesson to us at the present moment. Iron plating to resist shot in the most successful manner must be backed by a rigid yet somewhat elastic mass possessing the quality of a cushion, and wood is the best material for this purpose. A useful lesson of a similar nature was once learned in the construction of railways. It was supposed that a solid bed of granite would be the best for the rails. This was tried in one or two instances when it was found impossible to prevent the keys from starting and the rails breaking. Wooden sleepers were found to possess the requisite elasticity for withstanding the concussions of the engines.

CUTTING FILES BY MACHINERY.

It would have been supposed that cutting the teeth of files would be one of the very first operations in the arts to be performed by mechanism. The material is the best adapted of any to be held and controlled by machinery, and the process consists of numerous repetitions of the same simple operation. But in practice, obstacles have been encountered which have until very recently baffled the persevering ingenuity of the civilized world. There is a prevalent notion that the principal one of these obstacles was the difficulty of imitating the peculiar rolling motion of the chisel with which the workman accompanies the blow to give the required form to the tooth; and a vast amount of inventive talent has been devoted to the task of imitating this motion.

Among the numerous inventors who directed their attention to this promising field was William Van Anden, of Poughkeepsie, in this State, and, like others, his efforts were principally devoted to the task of imitating the motion of the hand cutters. In this he succeeded perfectly; but on taking his files to file makers they told him that the teeth were cut with a chisel that was too blunt. He went home and ground his chisel to a thinner edge, when his files were pronounced better, but still not perfect. He then ground his chisel just as thin as those used by hand cutters, when he succeeded in producing files that were declared perfect. But he now broke so many chisels as entirely to counterbalance the advantages of his machine. He sought out a journeyman file maker, and stated the facts to him, and received the reply that the same is the case in hand cutting. The workman grinds a dozen chisels in the morning, and when he snips the edge of one he picks up another, completes the imperfect cut and goes on with the work. Snipping the edge of a chisel is a matter of small importance in hand cutting; but this is not the case in cutting by machinery, for, unless the machine is very closely watched, a number of bad teeth will be made, and the blank will be spoiled, while the time required to change the chisel interferes too seriously with the rapidity of the work.

Mr. Van Anden had now discovered the real obstacle in the way of cutting files by machinery. This was not the difficulty of imitating the peculiar motion of the hand cutters, but the frequent breaking of the chisel. This difficulty, apparently resulting by fixed necessity from the relative hardness of the tool and the material to be operated upon, seemed to be insurmountable, and our inventor decided to abandon the attempt. But the idea happened to occur to him that if he could strike a lighter blow, and cut each tooth by a succession of two or more blows, the thin edge of the chisel would not be broken. He suggested this plan to a file manufacturer, who assured him that it would not work. He determined, however, to try it, and produced a file by this method which the same manufacturer declared to be perfect.

The mechanical success being thus assured, Mr. Van Anden found no difficulty in enlisting a firm of extensive file importers in the enterprise of manufacturing the machine files; and though some money difficulties, resulting from the war, have delayed the commencement of operations, the delay will probably be only temporary, and the enormous labor of cutting file teeth will soon be transferred from human muscles to the powers of water and steam.

We recently had an opportunity of witnessing the operation of a set of Mr. Van Anden's machines, which had been temporarily set up at the works of Mr. Althause, at the corner of Greene and Houston streets, in this city. A number of file makers and dealers were present, and seemed to be well pleased with the work. The machines are very ingeniously designed, the variations in the width of the cut and the force of the blows being provided for by simple and direct devices. It is very gratifying to observe the enterprise that inaugurates a great new industry in the midst of the war.

CEMENT FOR THE BRASS MOUNTINGS OF PARAFFINE LAMPS.—Take equal parts of gum shellac, common resin and brickdust, and reduce them to a fine powder in a mortar. Fill the inside of the brass mounting with this cement, and place it on a piece of sheet iron over the fire, or gas flame, until it melts; then press down the lamp on it, and allow all to cool. The cement should not be allowed to flow over on lamps with screwed sockets, as it is difficult to remove it from the thread.

CAN FROGS LIVE IN A STONE?—In 1852 Mr. Seguin inclosed twenty frogs and snakes in mortar, in order to decide the question whether it was possible for them to live entirely deprived of air. In course of time most of the blocks of mortar were lost, but two which remained were opened last week in the presence of a committee of the Academy of Sciences of Paris. A viper was found in one and a frog in the other—both dead and dried up.

The Great Eastern.

The *Haverfordwest Telegraph* describes the manner in which the *Great Eastern* was put on the grid. iron at Neyland. The ship left her moorings at Milford, and was taken up the Haven:—"On rounding the Wear Point, passing the *Blenheim*, and up to the *Hazlebeach*, she steamed at half-speed, as it was Captain Ivemy's intention to put her nose on the mud a little below the gridiron, so that she might swing, and come stern round with the rising tide. For this purpose strong hawsers were brought to shore, and others attached to the accompanying pilot tugs, but in performing this necessary duty a most deplorable accident occurred. Lord Frederick Ker, of the *Blenheim*, had sent a boat to assist in carrying the hawsers, and otherwise to render help. A rope was thrown from the *Great Eastern* to the *Blenheim* boat, which was quickly fastened round one of the thwarts of the boat. While this was being done the hawser was rapidly paid out from the ship, and it is supposed the tide drifted the slack or bight of the hawser under the screw, for instantly the rope got foul in one of the fans, and the first revolution drew the *Blenheim* boat right in upon the screw. Thirteen of the men, seeing their imminent danger, threw themselves into the water; the remaining four failed to escape in time, and the boat was rapidly sucked in the maelstrom formed by the screw revolutions. All hope seemed to have abandoned them, when one of the fans threw the boat up, and then drew it in between the screw and the vessel. The accident was so unexpected and so sudden that it was impossible even to cut the rope before the boat was sucked in upon the screw. The four men were speedily rescued from their dangerous position, and the screw was then gently moved, in order, if possible, to let the boat down uninjured. The first rise of the fan, however, smashed her in atoms, and the pieces of her wreck were whirled about in all directions by the rapidly incoming tide. Meanwhile the situation of the men in the water was most perilous. They had flung themselves out of the boat into the very rush of the tide, which was coming up with racehorse speed, and in a moment or two they were carried some hundred yards from the scene of the accident, and were widely scattered over the water. A seaman standing on the quarter-deck of the *Great Eastern*, seeing one of the men struggling in the water, seized a rope and sprang into the boiling flood beneath. The noble fellow, striking out, seized the sinking man by the hair of his head, and held him up above water, and presently a boat came and took them both in. Another man, named Harry Rees, succeeded in rescuing two of the men; and altogether 11 were brought safely to the shore. The other two were drowned. But to return to the *Great Eastern*. The hawsers parted before the chains could be got out, and the mighty vessel drifted almost helplessly down the channel, and struck the *Blenheim*. The *Blenheim's* bowsprit, and jib-boom, and foreyard, as well as her moorings, were completely carried away, and it is feared that her foremast also is seriously sprung. In this collision the little steamer *Milford Haven* had a narrow escape from destruction. She was actually between the *Blenheim* and the *Great Eastern* when the latter was only a few yards from the former. The *Milford Haven* then used her wheels to some purpose, and just managed to get from between the two ponderous bodies when the crash was heard. The *Great Eastern*, having passed the broadside of the *Bleinheim*, anchored just below in mid stream. On Monday morning the *Great Eastern* steamed up again to the gridiron, and in about an hour was successfully placed upon it without any further accident or mishap."

PORTRAIT OF CAPT. ERICSSON.—On the first page we give a likeness of Capt. Ericsson with a sketch of his life. There have been several portraits of him published since the brilliant success of his battery, but this is by far superior, not only in the quality of the engraving but also in the correctness of the likeness, to any other that we have seen.

T. P. Shaffner, is urging the laying of Atlantic cable by the Greenland route on the attention of the citizens of London. It is believed, that a second Atlantic cable will be laid within two years, but whether by the Greenland or the Newfoundland route, is not yet decided.

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NOTES ON FOREIGN INVENTIONS AND DISCOVERIES.

Flame Extinguishers.—A patent has been taken out in England by O. Williams for a compound liquid composed of alum, soda, borax, common salt and oil of vitriol all combined together in water to be forced by a pump upon a fire to extinguish the flame. The liquid is also capable of rendering cotton and linen fabrics uninflammable. L. Roughton has taken out a patent with the same object in view, but the method proposed is more rational. He runs water pipes along all the floors of a building, and these are fitted with pendant valves and nozzles, which, by an automatic connection outside, they may be opened to make the water flow inside of the different stories.

Seamless Woven Gloves.—A patent has been taken out by E. T. Hughes, London, for manufacturing woven gloves or mittens without seams. They are woven in the ordinary knitting frame, combined with a Jacquard machine, which controls the shape and size of the gloves by pattern cards. A number of such gloves are woven at the same time, according to their size and the width of loom, and when a piece is completed each glove is cut out and obtained in a finished state.

Fire-Proof Buildings.—The great fire that occurred in London last year has incited inventors in England to devise superior fire-proof warehouses, and, as a consequence, quite a number of patents have lately been taken out for improvements in connection with this subject. J. Simmons, of Battersea, proposes to make all the cast-iron columns, and all the iron girders used in buildings hollow, and to support the floors of all buildings with these in a connected series from the basement to the roof. They are to communicate with one another and form a complete water channel, and be connected with a cistern of water on the roof. By this arrangement, should a fire occur in any part of the building the adjacent hollow metal supports will become heated, and the water in them will be made to circulate and absorb the heat. A heated stream will flow upward and a cold one downward. The columns and girders will then be kept cool, and not expand, nor be thrust out of position. The walls of such buildings will remain firmly in their places, because those which fall during fires are generally forced from their upright position by the expansion of beams and other supports.

Shot-Proof Iron Ships.—Among the many plans presented recently for constructing shot-proof iron-clad frigates, I. M. Rogers, of Robertstown, Ireland, has taken out a patent for setting the plates edgewise to receive the shot. The keel of the proposed vessel is made of a series of plates, running longitudinally, and cruciform in the cross section. These plates are bolted to angle irons. Upon this keel the hull of the vessel is built, and formed of lines of iron plates, set edgewise, and the breadth of these plates is the thickness of the hull, alternated with planks of teak. These plates take the varying curve of the cross sections of the vessel and extend to the bulwarks. They are secured together in groups by short screws passing through them, and also by long screw bolts, which run through a greater number of the plates and teak planks. The plates are so arranged as to form a component part of the framing. A hull of enormous strength is thus obtained. By the common mode of constructing iron plated frigates, the plates do not assist to strengthen the hull. The upper deck is constructed on the same principle as the hull.

New Pigment for Painting China.—T. Cobley, of Meerholz, Germany, has taken out a patent for manufacturing fluo-silicate of tin as a new pigment. He makes it by dissolving the oxide of tin in fluo-silicic acid, or by decomposing a solution of the common salt of tin, by fluo-silicic acid. The fluo-silicate thus obtained is heated with the sulphide of ammonium or sulphureted hydrogen, and forms the sulphide which is used as a pigment, and also as a glaze for porcelain.

Improved Cast Steel.—There seems to be no end to the improvements which are being continually made in the manufacture of steel. R. Mushet, of Coleford, England, who has already taken out a great number of patents for mixtures, and processes connected with steel making, has lately secured another patent for making improved steel, as follows :—Pulverized pig iron is mixed with pulverized iron ore or oxide of iron and manganese, and these are smelted in a crucible. Cast steel of a certain quality is thus produced direct from pig iron, but a superior quality is obtained, by adding to the mixture some pulverized wolfram and chrome ore or oxide of chromium.

Additions to Factories in Lowell.

The Lowell *Courier* says there will be more work done in the way of building and improvement of the great mills than has been done for some twelve years.

The Lawrence Corporation will build a large picker house this season, back of their mills, and the Tremont contemplate enlarging and adding to the hight of their picker house.

Arrangements are being made to reconstruct the mills on the Suffolk Corporation, enlarging them and throwing the three into one. The front wall will be taken down the whole length of the three mills, and re-built, so as to make the mill 20 or 22 feet wider, adding from 40 to 50 per cent to the room which they now contain, giving a larger area for the machinery now contained in them, and making room for new whenever it may be desirable to add it. The mills will be built higher than the present ones, and each story will be raised, making the rooms much more commodious and airy. The partitions between the mills will also be removed, throwing each story into one long room.

The Physical Man of Ohio.

The Commissioner of Statistics of the State of Ohio in his annual report, gives a curious description of the physique of the men of that State.

The Commissioner says that Professor Henry and himself have been several years engaged in defining the American man, by accurate measurements. He presents only such of these as go to describe accurately the men of Ohio. For this purpose he gives the measurements of 300 farmers, miners and laborers in several counties ; of 230 others in eleven villages, and five companies of Kennett's Cavalry, all native Americans. The following appears to be the general result of these measurements : That the man of Ohio is five feet nine and one-third inches high, and is taller than any European nation of which there are measurements. He is taller than the Belgian by several inches, taller than the English, and even than the Scotch Highlanders. The Highlanders, however, exceed the American round the chest, and are, on the whole, the stoutest. In complexion, eyes and hair, the light predominates over the dark. The prevailing hair is brown, and eyes gray, or blue.

A Curious Development.

The *Commercial Bulletin* in referring to a recent letter of Donald McKay publishes the following statement :—"Would the nation believe it, that the very plans and specifications by which the rebel steamer *Merrimac* was rendered shot-proof, were furnished by Mr. McKay to our own Navy Department, nearly a year ago, to be applied to our own vessels for harbor defence ? Yet such is the fact. How did the rebels obtain them ? Mr. McKay says that when he produced his plans to build an iron-cased vessel-of-war, the Secretary of the Navy and the President were anxious that such a vessel as he proposed should be built without delay ; but the chief naval constructor, when the plans were submitted to him, would not even turn his back to look at them ; but answered Mr. McKay, over his shoulder, that iron-plating was a humbug. Finding that it was time thrown away to remain in Washington, Mr. McKay left to look after his own business at home."

Ship Building on the Lakes.

We take the following, in reference to ship-building on the Lakes in 1861-2, from the Chicago *Times*, from which it will be seen that active preparations have been and are now making for the carrying trade on the opening of inland navigation. The following is a summary of the vessels building at various ports on the lakes in the Winter of 1861-62 :—

29 steam vessels, aggregate tunnage	10,120
62 sail vessels, aggregate tunnage	24,983
91 vessels building, total tunnage	35,103

The following is a summary of vessels built in 1861, and now on the register :—

20 steam vessels, aggregate tunnage	2,693
62 sail vessels, aggregate tunnage	18,192
82 vessels built, total tunnage	20,705

Significant Testimonials.

The annexed letters, which came to hand about the same time, express the sentiments of scores of others constantly being received at this office ;—

MESSRS. MUNN & CO.—Next to the gratification of knowing one has invented something useful, is to be advised in due season that the invention is secured to you. In our case our pleasure is due in a great measure to your superior facilities for transacting business. Please accept our thanks for the able manner in which you have prosecuted our case to a successful issue.

Respectfully yours,
COLVIN & GARDNER.

Philadelphia, Pa., No. 118 North Broad street.

[The invention referred to relates to a mode of telegraphing by signal lights. The mode of operation is quite novel, and the inventors have a good invention. —EDS.

MESSRS. MUNN & CO.—I have to render you many thanks for the promptness and ability with which you have conducted my business, and shall try to impress it upon all who may have any such business to transact that the Scientific American Patent Agency is not only the oldest and best-established agency in the country, but that it has many claims and advantages that no others possess ; and that they can commit their business to your care with perfect confidence of your fidelity, reliability and competency to discharge the same to their entire satisfaction ; and I shall, also, try to impress the fact that they can do their business, by correspondence, through your agency, quicker, cheaper and better than they could themselves if at the Patent Office ; and I shall, also, advise all who may have any business to commit it to your advisement, and if there is nothing in it patentable you will tell them so at once, and save further expenses, and if there be any thing new and patentable you will leave nothing undone till a patent is obtained.

Ere long I shall send for a series of what back volumes you may have of the SCIENTIFIC AMERICAN, and I would like to obtain both the old and the new series complete from its commencent, for I think it is what no man who has any interest in the arts and sciences, can afford to do without, and that what is not to be found therein fully discussed and dissected, is hardly worth looking for.

Yours truly,
JOHN J. KIMBALL.

Naperville, Ill.

MESSRS. MUNN & CO.—*Gents:*—I have just received my Letters Patent. I feel under obligations to you for the energy you have used in putting my claim through. I am also very much pleased with the skill that you have shown in getting up the drawings and claims. I will most cheerfully recommend any person that has business to do with the Patent Office to do it through your agency. My prospects are very good for doing well with my patent.

Yours truly, GEO. M. ZELL.

Waynesville, Ohio.

WESTERN GUNBOATS.

Although the mail-clad Western gunboats did good service at the taking of Fort Henry, and in the attack on Fort Donelson, these conflicts also revealed great defects in them. Their pilot houses were originally constructed of timber thirteen inches in thickness, plated with two and a half-inch iron. As they were circular towers, rising seven feet above the upper decks they formed conspicuous objects for the artillery of the enemy. Four of these pilot houses, we understand, were penetrated at Fort Donelson, and two of the pilots were killed. Since then an extra plating has been put on several of them making the total thickness of iron five inches. This we think will resist the largest shot which will be thrown against them by the secessionists, unless they have larger guns than 11-inch Dahlgrens. As several more iron-clad gunboats are intended to be constructed for the Western waters they will undoubtedly be constructed in a superior manner to those which have already been built. With the experience which has been obtained in constructing and fighting the present river gunboats, the new ones should be decided improvements.

Case-Hardening Wrought Iron.

Case-hardening is that process by which wrought iron is first converted exteriorly into steel and is subsequently hardened to that particular depth ; leaving the central parts in their original condition of soft, fibrous iron.

The old agents used for case-hardening are animal matters, as the hoofs, horns, bones and skins of animals ; these being nearly alike in chemical constitution, and they are mostly charred and coarsely pounded. Some persons also mix a little common salt with the preceding. The new method is to coat the article with a paste of prussiate of potash and flour, allow this to dry, then keep the metal in a clear fire until it becomes red hot, after which it is plunged into cold water.

By steeping shingles in a solution of the sulphate of copper or in lime water they will endure much longer than common unprepared shingles.

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RECENT AMERICAN INVENTIONS.

Shingle Machine.—Messrs. N. Shaw, W. B. Eastbrooks and C. A. Piper, of Eau Claire, Wis., have secured a patent for a shingle machine of that class in which circular saws are employed for cutting the shingles from the bolt. The object of this invention is to obtain a machine which may be rendered available for cutting up the refuse stuff of sawmills into shingles, such for instance, as slabs, broken scantling, boards, planks, &c. It consists in a novel and improved bolt-adjusting mechanism, whereby the bolt is adjusted automatically by the reciprocating movement of the carriage, in such a manner as to cause the shingles to be sawed from the bolt in proper taper form, the point and butt being cut alternately from opposite ends of the bolt. The invention also consists in a means for varying the thickness of the shingles and properly supporting the same until the proper time arrives for them to drop from the machine or carriage. The invention further consists in a novel means for operating the bolt carriage through the medium of the foot of the operator.

Sugar Mold Carriage.—This invention, secured to T. A. Havemeyer and Henry Schnitszpan, of New York City, relates to an improved carriage for conveying sugar molds from the coolers in the refinery to the apartment in which they are placed to admit of the draining operation being gone through with. The object of the invention is to obtain a carriage for the purpose specified which will admit of being adjusted to suit molds of different sizes, and also be capable of being moved about with greater facility than those previously constructed. The invention consists in supporting and retaining the upper parts of the molds by means of two adjustable horizontal plates attached to the carriage ; also in using, in connection with said adjustable plates, a fixed frame or plate provided with inverted conical recesses to receive the tips of the molds. The invention further consists in a novel arrangement of a caster wheel which supports the front part of the carriage, all devised so as to effect the desired end.

Casting Iron Pipes.—The object of this invention is to cast pipes, such as are generally used for gas and water pipes without a "chill," or in other words, to cast the pipes so that they will not be brittle or hard as when cast in the ordinary way. To this end a metallic mold is used in connection with a certain wash or composition, whereby the mold may be heated to receive the melted metal, and the latter when cool readily taken from the mold the pipe not adhering to it. The patentee is John Kinniburgh, of Lanarkshire, Scotland.

Photographs of the Interior of the Eye.

At the February meeting of the American Photographical Society, Dr. Henry D. Noyes exhibited a negative showing the optic nerve and interior of a rabbit's eye. The impression was obtained by a newly invented instrument devised by himself and Mr. Grunow, a practical optician. Such a photograph has never been obtained before in this country, although it is said to have been done in France. The interior of the eye, namely, the retina and optic nerve, has been disclosed to observation in the living person, by an instrument invented in Germany, called the opthalmoscope. This has been in use for ten years, but it is only now that the interior of the eye has been photographed. Dr. Noyes explained the working and principles of the new opthalmoscope, by the aid of diagrams and the presentation of the instrument itself. Through it diseases of the eye can be studied with greater facility and scientific records of them kept. The instrument displayed, in its elegant and finished workmanship, the highest mechanical skill. The discourse of the doctor was listened to with close attention, and the audience expressed their approbation by applause.

THE inventive faculty never slumbers in those who are largely gifted with it. It is alike active in the workshop, the home or the camp, and even on the march. As evidence of this, we have just received a description and drawing of a very ingenious repeating or self-loading gun from one of our soldiers in Fort Donelson, Tenn., so recently occupied after such a desperate fight. The letter was written very hastily, as the writer was about to march again with his regiment.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING MARCH 18, 1862.

Reported Officially for the Scientific American

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,667.—Ellen B. Boyce, of Greenpoint, N. Y., for Improved Washing Machine :

I claim the arrangement, as described, and in combination with each other, of the corrugated or ribbed and grooved bottom, 1, corrugated or ribbed sides, 2, corrugated or ribbed center piece, 3, lever, 4, rings, 5 5, and rounds or slats, 6, as set forth in the purpose specified.

34,668.—R. D. Cary, of Philadelphia, Pa., for Improvement in Sweeping Machines :

I claim, first, Combining and arranging one or more brooms, I, with the traveling wheels of a wagon or cart, or with intermediate gearing, substantially as described, so as to give a sweeping movement to the brooms, substantially as and for the purpose set forth.

Second, The lugs, i i i i, or their equivalent, constructed and arranged, in relation to the connecting rods, M, substantially as described, for the purpose of raising the brooms in their backward movement, as set forth

Third, The arrangement of central brooms, N, with the side brooms, I, or in lieu thereof, substantially in the manner and for the purpose set forth.

Fourth, The combination and arrangemnt of scrapers with a sweeping machine, substantially as described for the purpose set forth.

Fifth, Combining and arranging the sprinkling tube, O, with a sweeping machine, substantially in the manner described for the purpose set forth.

34,669.—Nathan Chapin, of East Saginaw, Michigan, for Improved Apparatus for the Manufacture of Salt :

I claim, first, Submerging a doubly inclining floor in a vat of brine with its two margins elevated to the surface separating the brine in two bodies upper and lower while the heat therein is connected through the floor, and combining with said floor metallic partitions for transmitting heat direct through said partitions and brine from the more heated to the less heated sections of the vat, for rapid equilization of temperature, while the brine is thereby detained to a moderate flow in passing from one end of the vat to the other.

Second, I claim adding to said combination submerged furnaces in both bodies of brine, parallel with each other, for cleaning in the lower while granulating in the upper body, as described.

Third, I claim adding still to this combination perforated covers over a steam chamberconnecting said incline plane floor with the salt bins for draining chlorides from the salt after raking and before dumping into the bins.

Fourth, I claim combining with this entire apparatus opening covers over the building inclosing it for solar assistance in artificial evaporation, as described.

Fifth, I claim placing partitions upon the sides of my submerged furnaces, as described, for preventing the boiling brine thereon from mixing with the main body and interfering with its quiet precipitation of impurities.

34,670.—James Cochrane, of Harburn, Scotland, for Improvement in Wet Gas Meters :

I claim the inclosing of the float of the gas inlet valve in a special chamber or compartment which is separate and distinct from the main water or measuring chamber of the meter and the introduction of the lower end of the water supply pipe into such separate chamber, for the purpose described.

34,671.—A. Colburn, of Leominster, Mass., for Improved Mode of Attaching Horses to Vehicles, and Detaching them therefrom :

I claim, first, The mode described of attaching horses to vehicles by means of the draw bar, C, draw pins, D, and double slotted plates, E I J, when combined and arranged to operate, as set forth.

Second, The combination of the strap, H, rings, f, draw bar, C, spring, e, and slotted plates, E I J, when arranged to operate in the manner and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient device for attaching horses to vehicles, which, besides enabling the horse to be more easily and expeditiously attached or detached from the carriage, will bring the animal under the perfect control of the driver, so that in case he attempts to run away, or in any other manner becomes unmanageable, he can be freed or let loose from the carriage without endangering the lives of the persons therein.]

34,672.—A. O. Crane, of Hoboken, N. J., for Improved Convertible Boat, Bridge and Tent :

I claim the combination of the uprights or supports, E, and canvas, F, with a folding boat, A A′ c c, constructed substantially as and for the purposes explained, either with or without the canvas, B.

I also claim the adjustable rowlocks, C, fitted loosely in the bars, e, and employed in connection with buttons, D, pivoted to the bars, g, as and for the purposes set forth.

I further claim securing the end pieces, c c, and sides, A′, of the boat in proper position by means of the sockets, j, at the ends of the sides, A, and the cross bars, i, on the outer parts of the end pieces, c c, in connection with the hooks and staples, k l, substantially as shown and described.

[The object of this invention is to obtain a tent, boat and bridge, combined in such a manner that the device may be readily adjusted for use in any one of the capacities mentioned, and answer equally as well as if made specially for it, and at the same time be capable of being compactly adjusted together to facilitate transportation.

34,673.—W. H. Deviar, of Valley Township, Mo., for Improved Amalgamator for Gold and Silver :

I claim forcing the pulp containing the precious metal up through the column of mercury, substantially in the manner described for the purpose specified.

34,674.—William Ebbitt, of New York City, for Improvement in Boxes for Car Axles :

I claim the employment of the chilled iron bearing, f, for the axle, a, fitted and acting substantially as and for the purpose specified.

I also claim the metallic collar, 2, permanently formed on or attached to the axle, a, when inclosed within the chamber, e, that has an opening at the bottom, said collar forming a centrifugal dust and dirt excluder, as and for the purposes set forth.

34,675.—E. Edwards and Joel Cowee, Jr., of Keene, N. H., for Improvement in Machines for Cutting Chair Backs :

We claim the combination and arrangement of the oscillating cutting tools, B B, the revolving table, A, and patterns, C C, operating substantially as and for the purpose set forth.

34,676.—Thaddeus Fairbanks, of St. Johnsbury, Vt., for Improvement in Platform Scales :

I claim, first, Securing the pillar, B, to the base and supporting it in both the upright and horizontal positions, by means of the lugs, D E, and ears, a, or their equivalents, substantially in the manner described.

Second, The employment of the dog, F, in combination with the folding pillar, B, for the purpose of readily securing and releasing the latter when in the upright position.

Third, Folding the beam, K, and its attachments against or within the pillar, B, substantially as and for the purpose set forth.

Fourth, The double-acting cap bolt, N, in combination with the folding cap, H, and pillar, B, for fastening the said cap, H, in both the folded and extendad positions by the same bolt, substantially as specified.

Fifth, The combination of the loop or handle, g, and screw, G, for tightly confining the pillar, B, to the base when in the folded condition, substantially as shown.

Sixth, Stowing and confining the poise, W, within a pocket or recess, P, in the platform, substantially as and for the purpose set forth.

34,677.—Joseph Firmenich, of Buffalo, N.Y., for Improvement in Dermopathic Instruments :

I claim a dermopathic instrument constructed substantially as described, having a cylinder or cup which contains the puncturing needles, and a medicinal preparation in contact with the needles, so that the skin of the patient may be punctured and the medicine infused at one operation of the instrument, as set forth.

34,678.—J. E. Fisk, of Salem, Mass., for Improvement in Dry Gas Meters :

I claim, first, The vertically vibrating rod or rods, I, in combination with the diaphragm or diaphragms of a gas meter, for the purpose set forth.

Second, The detachable gas valve chest, D1, constructed as described, in combination with the diaphragm chambers and the gearing chamber, for the purpose set forth.

Third, The combination with a valve, M, operated substantially as described, of the vibrating rods, I, of the diaphragms, and the connecting arms, K, of the crank shaft, L, for the purpose set forth.

Fourth, The flexible sleeves, J, substantially as and for the purpose set forth.

Fifth, Attaching the diaphragm, C, to the vertically vibrating rod, I, by means of the cross, c, on the end of the rod, and the connecting links, e e e e, in the manner and for the purpose described.

Sixth, The thimble socket, g, and rocking journals, f, of the vibrating rod, for supporting the diaphragms and allowing the rod to vibrate, substantially as described.

34,679.—W. A. Foster, of Fitchburg, Mass., for Improvement in the Means of Operating Cut-off Valves :

I claim operating the cut-off valve by the link, F, which operates the main valve, substantially in the manner specified.

34,680.—Michael Galvin, of Scranton, Pa., for Improvement in Hand Tenoning Machines :

I claim the combination of the sliding scale, H, stop, I, thumb screw, J, with the box, A, cap, C, and clamping screws, D E, when arranged and operating in the manner and for the purposes described.

[The object of this invention is to obtain a simple and efficient device for cutting tenons by hand which is adapted for all ordinary work and does not require the work to be laid out first, and which can be furnished at so low a cost as to bring it within the reach of every mechanic.]

34,681.—Daniel Gilbert, of Middlefield, N. Y., for Improvement in Wheel Vehicles :

I claim the rotating axles, H M, with the friction roller bearings, F F G G, in combination with the wheels, O, placed loosely on the arms, a, of the axles, as and for the purpose set forth.

[This invention consists in having the axles of the wheels fitted underneath friction rollers attached to the bolsters of the vehicle, so that the axles may rotate freely, and having the wheels fitted loosely on the arms of the axles whereby the axles, and wheels are allowed to rotate independently of each other, and the draft of the vehicle thereby rendered extremely light, much less so than the draft of ordinary wheel vehicles.

34,682.—B. D. Godfrey, of Milford, Mass., for Improvement in India-Rubber Boots and Shoes :

I claim a double india-rubber sole for boots and shoes, the two portions being each vulcanized in a mold, and so formed that their surfaces of contact shall be exactly adapted the one to the other and will adhere to each other when the cement is applied, without being held pressed together for the purpose specified.

34,683.—Earl Guyer, of Wolcott, Vt., for Improvement in Stoves :

I claim, first, An auxiliary stove with hollow non-conducting walls, made in two parts and with hinged side and top doors, and with a passage for a draft flue for use in connection with an ordinary cook stove in the manner described.

Second, In a non-conducting auxiliary stove, which is capable of being wholly removed from an ordinary cook stove after having been made to envelope the same for a season, I claim the combination of the front stationary fender portion, U, and the top and side hinged portions, B D D, whereby the top of the stove can be exposed at top and sides and the cook at the same time shielded from the intense heat, as described.

34,684.—Earl Guyer, of Wolcott, Vt., for Improvement in Saw Mills :

I claim the combination of the inclined rails, I I′, lever arrangement, L L M N, and attachments, m n r Q R, of the carriage, E, substantially as and for the purposes set forth.

34,685.—John M. Hathaway, of New York City, for Improvement in Explosive Shells for Ordnance :

I claim, first, The arrangement of the diverging barrels, g g, connected together at their base by the circular groove, S, surrounding the chamber, b, and fired in the manner specified.

Second, I claim the lead ring, c, provided with a corrugated sheet metal band, in combination with the circular and longitudinal grooves, 4, at the tapering end of the bomb, as and for the purposes set forth.

Third, I claim the elastic base, b, in combination with the tapering corrugated metal, d, in the manner and for the purposes specified.

Fourth, I claim the disk, e, through which the fuse, i, passes, when fitted as set forth, to regulate the length of said fuse as specified.

Fifth, In combination with the base, b, and disk, e, I claim the pin, f, divided washer, 6, and conical ring, 7, for the purpose set forth.

Sixth, I claim the tapering sheet metal spring, l, constructed as specified and applied to sustain the detonating plug, k, as set forth.

Seventh, I claim the rollers, 2 2, arranged and applied as shown, to take the rifling grooves, for the purposes specified.

34,686.—T. A. Havemeyer and Henry Schnitzspan, of New York City, for Improved Carriage for Sugar Molds :

We claim, first, The adjustable plates, G H, provided with arms, f f′, and arranged or applied to the carriage, substantially as and for the purpose set forth.

Second, In combination with the adjustable plates, G H, the frame, A, provided with recesses, k, to receive the tips, l, of the molds, as specified.

Third, Providing the frame, A, with a recess, e, at its front part or end, as shown, when said recess is used in connection with a hollow post, E, to receive the arbor, c, of the caster wheel, C, and said post is attached to frame, A, to support the front ends of the plates, G H, as set forth.

Fourth, The combination, construction and arrangement of the parts shown and described, to operate as and for the purpose specified.

34,687.—M. L. Horton, of Claremont, N. H., for Improved Mop Head :

I claim the combination of the parts, A and C, and adjusting them, or firmly holding them in any required position, by means of the ratchet arm, B, dog E, and spring, d, operating as described, and for the purposes set forth.

34,688.—J. J. Johnson, of Kalamazoo County, Mich., for Improved Tanning Process :

I claim the employment of the liquor, compounded of fermented bran, water, common salt and sulphuric acid, substantially in the proportions and manner specified, and its combination with the solution of lime and wood ashes in water, and with the stuffing of fish oil, alcohol, flour, paste and tallow, substantially in the proportions and manner set forth.

34,689.—C. Meyer, of New Brunswick, N. J., for Improvement in Boots and Shoes :

I claim so extending the width of the shank of a boot or shoe sole that when applied to a boot or shoe said sole shall form a lateral wearing protection on back side of the boot or shoe, in the manner and for the purpose set forth.

34,690.—J. Milholland and J. J. Lahaye, of Reading, Pa., for Improvement in Journal Boxes :

We claim, first, The cork packing, J, and the detachable plate, I, when both are arranged in the rear of the box, and confined therein by the recess, t, and key, D, as and for the purpose set forth.

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Second, The cork packing, J, severed at one point, in combination with the strap, n, and spring, p, the whole being constructed and arranged substantially as and for the purpose specified.

Third, The cover, E, having a recess, f, filled with cork and applied to the front of the box, in the manner and for the purpose specified.

Fourth, The hollow projection, G, the lid, H, with its dovetailed recess, containing the cork packing, k, the spring for depressing the lid, the socket, i, or its equivalent, the whole being arranged and combined with the detachable cover, E, as and for the purpose set forth.

Fifth, The projections, v v, applied to the plate, L, substantially in the manner and for the purpose specified.

34,691.—Richard Mohler, of Lancaster, Pa., for Improvement in Smut Machines:

I claim the branch arch, K, with its tube, L, hopper, V, and connecting neck, k, when combined with the main arch and its chambers, as specified, for the purpose and in the manner set forth.

34,692.—W. P. Parrott, of Boston, Mass., for Improvement in Method of Laying Stone, &c., Under Water:

I claim the method, substantially as described, of laying stone wall or masonry under water.

34,693.—T. F. Reilly, of New York City, for Improvement in Rotating Projectile for Smooth-bored Ordnance:

I claim, first, So forming and arranging the projectile, the explosive material, and the interior of the gun, that the explosion shall act directly upon the shot, in such manner as to give it a rifle motion, substantially as set forth.

Second, Controlling the twisting or rifle motion of a projectile, rotating within a smooth-bored gun, as described, by means of surfaces, b c c, arranged to act upon each other in the manner and with the effect set forth.

Third, Forming the parts, B′ B′, or equivalent, abutments at the base of the bore of the gun, upon a piece, B, separate from the gun, for the purpose set forth.

34,694.—Joseph Rohmer, of Chicago, Ill., for Improvement in Grain Winnower:

I claim, first, The arrangement of the adjustable partition, L, sieves, g g′, and fan, D, constructed and operated as and for the purpose set forth.

Second, The arrangement of the adjustable trap bottom, B, connected with the sieve frame, i, the arm, r, strap, l′, and adjustable spring, z, as and for the purpose set forth.

34,695.—F.M. Ruschhaupt, of New York City, for Improved Apparatus for Preventing Malt Liquors from becoming Flat:

I claim the improved arrangement for the application of carbonic acid gas, in the manner described and for the purpose set forth.

34,696.—T. H. Russell, of Northfield, Vt., for Improvement in Water Wheels:

I claim, first, The socket, h′, semisphere, i, ring, G, provided with the inclined surfaces, j, and frame, F, provided with the inclined surfaces, k, in combination with the toothed segment, H, and pinion, I, all arranged as shown, for the purpose of raising and lowering the wheel, D, and shaft, E, as set forth.

Second, The packing, C, when applied to the wheel by means of the shoulder, e, of the flanch, b, of the case, A, and the adjustable flanch, B, connected to and arranged with flanch, b, as shown, for the purpose of expanding the packing and fitting it snugly and water tight around the wheel, as described.

Third, The chutes, K, when constructed as shown and arranged relatively with the buckets, h, of the wheel, D, to operate as and for the purpose specified.

Fourth, The arrangement with chute cases, M, of the recesses, O, concentric projections, p p, and radial projections, q, as and for the purpose set forth.

Fifth, The strips or cleats, O, attached to the annular gate, L, in combination with the adjustable ways, P, and friction rollers, c′, substantially as and for the purposes set forth.

[This invention relates to an improved water wheel, of that class which are placed on a vertical shaft, inclosed within a case, and provided with an annular gate and chutes to direct the water properly to the buckets.]

34,697.—Gelston Sanford, of New York City, for Improvement in Machinery for Breaking and Dressing Flax or Hemp:

I claim the fluted roller or rollers having a positive planet motion, substantially as described, in combination with a yielding-fluted concave, substantially as and for the purpose described.

I also claim the hatchel, in combination with the plated roller or rollers, having a positive planet motion, and the yielding-fluted concave, substantially as and for the purpose specified.

34,698.—Gelston Sanford and J. E. Mallory, of New York City, for Improvement in Machinery for Breaking and Cleaning Hemp or Flax:

We claim combining the fluted bars, substantially as described, for performing the compound operation of breaking and pounding flax or other like plants, with springs, substantially as described, to render such compound breaking and pounding surfaces yielding and self-adapting, substantially as and for the purpose specified.

We also claim, in combination with the fluted breaking bar, reciprocating by a positive motion, the making of the other or opposite breaking bar, movable, and connected with the frame by toggle joint levers and treddles, or their equivalents, substantially as and for the purpose specified.

34,699.—C. B. Sawyer, of Fitchburg, Mass., for Improvement in Hot-Air Furnaces:

I claim, first, The employment or use, for the purpose specified, of a water chamber, B, when applied substantially as described, either to the cold-air induction pipe or to the hot-air pipe, A, of an air-heating furnace, at a point sufficiently remote from the furnace to prevent the water reaching the boiling point, as set forth.

Second, The employment or use of a sponge, C, or other suitable material, placed in the cold-air induction pipe, or in the hot-air pipe, A, of an air-heating furnace, to serve as a separator to free the hot air, or air to be heated, from dust and other light impurities which may be held in suspension in it, substantially as described.

[This invention consists in applying a water chamber either to the hot-air pipe or cold-air induction pipe of an air-heating furnace, in such a manner that the air, when dry or devoid of a sufficiency of water will be allowed to take up or imbibe moisture, and the water chamber at the same time not act in the least degree to obstruct the free passage of the air. It also consists in the employment or use of a sponge or other suitable substance pervious to air, fitted in the hot-air pipe or cold-air induction pipe, whereby the air is separated from dust and other light impurities which are held in suspension in it.]

34,700.—G. W. Scollay, of St. Louis, Mo., for Improvement in Burial Cases:

I claim, first, The continuous grooves, b, in the joints of the coffin, for the purpose of cementing them and making them air tight, in the manner described and for the purpose specified.

Second, I claim combining a valve with a deodorizing chamber made in the coffin, for the purpose of deodorizing the escaping gas, as described.

Third, I claim the chamber, C, in combination with the coffin, and with or without the valve, r, and partition, d, for the purpose of holding the deodorizing material.

34,701.—Noah Shaw, W. B. Eastabrooks and C. A. Piper, of Eau Claire, Wis., for Improved Shingle Machine:

We claim, first, The pivoted bar, L, operated through the medium of the bars, K K, lever, M, plates, P Q, and bolt carriages, G, substantially as shown, for the purpose of adjusting the bolt from which the shingles are sawed, as set forth.

Second, The employment or use, in connection with the adjustable bar, L, of the rod, p, provided with the flanch, r, and fitted in the block, J, for the purpose of regulating the width of the shingles, as specified.

Third, In combination with the adjustable bar, L, actuated or operated as shown and described, the rod, s, provided with the bar, u, and arranged as shown, to serve as a support for the shingle being sawed.

Fourth, The two strips, D D′, provided with upper beveled or inclined surfaces, and arranged in relation with the saw, E, and the space or opening, b, in the carriage, G, as and for the purpose set forth.

34,702.—John Sloan, of Philadelphia, Pa., for Improved Insole for Boots and Shoes:

I claim an insole for boots and shoes, made of a thin metal bottom and a thin wooden top, the two united together, in the manner and for the purpose, substantially as described and represented.

34,703.—C. E. Sneider, of Baltimore, Md., for Improvement in Revolving Firearms:

I claim, first, The employment in a revolver of two many-chambered cylinders or series of revolving chambers, arranged breech to breech upon the same axis pin, substantially as and for the purpose described.

Second, The combination of the guide, q r s, with a pivoted hammer head, F, employed in connection with a revolving-chambered cylinder, in the manner and for the purpose shown and explained.

34,704.—J. F. Stevenson and T. B. Hammer, of McKee's Port, Pa., for Improvement in Mode of Lubricating Axles:

We claim the hub, A, chambered recess, a, channels, e, and thumb screw, g, when combined and arranged to operate in the manner and for the purpose set forth.

34,705.—Albert Tracy, of U. S Army, for Improvement in Tompion for Firearms:

I claim, first, The tompion for small arms and cannon, as shown in Figs. 1 and 2, and substantially as described.

Second, I claim also the modification shown in Fig. 4, substantially as described.

Third, I claim, also, the tompion, as claimed in the first and second claims, in combination with the removable key, substantially as described and shown in Fig. 5.

34,706.—Theodore Twickeler, of Boston, Mass., for Improvement in Needle Guns:

I claim the arrangement of the catch lever, O, the spring, i, and the thumb lever, I, furnished with a stud or shoulder, v, as set forth, with respect to the needle-bar carriage, and so as to operate in holding the spring, l, in a compressed state, in manner and under circumstances described.

34,707.—G. E. Van Derburgh of Mamaroneck, of New York City, for Improved Oil-Proof Cask:

I claim, as a new article of manufacture, a cask, a barrel, a keg, a firkin or other style of vessel, the inner surface of which has been rendered impervious to oil, turpentine, &c., by the single or repeated use of liquid silicate, substantially as set forth.

34,708.—Thomas Varney, of San Francisco, Cal., for Improved Device for Straining Gold and Silver Amalgam:

I claim the combination of the tub or vessel, A, strainer, C, and tube, D, arranged to operate in connection with quicksilver, as and for the purpose set forth.

[Gold amalgam has been hitherto strained by simply squeezing the quicksilver through buckskin with the hands. Silver amalgam is strained through a coarse cotton cloth, the quicksilver passing through by its own gravity. A considerable quantity of the silver (say from 3 to 10 per cent) passes through the cloth, and hence this plan is attended with considerable loss. This invention is designed to supersede the old modes of straining, and to this end atmospheric pressure is employed for forcing the mercury through the strainer.]

34,709.—Thomas Warker, of New York City, for Improved Bottle for Aerated Liquids:

I claim, first, The employment or use of a lining, e, of glass, or other suitable material, such as described, in combination with the metal fountain head, B, substantially in the manner and for the purpose specified.

Second, The arrangement of the circular bead or shoulder, i, on the top edge of the neck, a, of the bottle, A, in combination with the alternate vertical grooves and ridges, j k, as and for the purpose shown and described.

34,710.—R. A. Wilder, of Cressona, Pa., for Improvement in Hoisting Machines:

I claim, first, The combination of the brake band, with the rings of wood, or other material substantially the same, inserted in recesses on the perimeters of the brake wheels, substantially as and for the purpose set forth.

Second, I also claim attaching the rope or cable to the car or other weight to be raised or drawn up, by clamping it between two pieces of wood, or other material, (one or both of which should be fastened to said car or weight), in grooves of the shape in reverse of, or formed to fit the strands of the rope, substantially as described.

34,711.—H. M. Wyeth, of Pulaski, Iowa, for Improvement in Pumps:

I claim the combination and arrangement of the single side valve, e, with the pump box or chamber, A, and discharge pipe, substantially as and for the purposes set forth.

34,712.—J. H. Cables (assignor to the American Knife Company), of Plymouth Hollow, Conn., for Improved Combination of Knife, Fork and Spoon:

I claim the arrangement of the two yarts, A B, of the handle in combination with knife blade, C, fork, D, and spoon, E, and with hinged catch, g, elongated pin, d, spring, h, and curved slot, m, all constructed and operating substantially in the manner and for the purpose shown and described.

[The object of this invention is to obtain a knife, fork and spoon so combined in one article as to be conveniently carried in any pocket of a soldier's or traveler's garment, and without occupying any more room therein than an ordinary pocket knife, either of the instruments being capable of being detached from the two others, and as convenient for table use as the same when made separate and in the usual manner; the spoon also being easily detached from its handle so as to leave the knife and fork combined within the compass of a common pocket knife.]

34,713.—E. C. Dunning (assignor to Irving Hull), of Bridgeport, Conn., for Improvement in Metallic Cartridge Cases:

I claim a water-proof metallic cartridge case composed of two thicknesses of metal, combined and arranged in the manner and for the purpose substantially as set forth and described.

34,714.—John Ekin (assignor to himself and William and S. M. Allison), of Xenia, Ohio, for Improvement in Furnaces:

I claim the combination of the supply chamber, B, inclined grate, D, slag aperture, e, close ash pit, G, and and chimney, F, when constructed to operate in the manner and for the purposes explained.

[In this invention the weight of fuel in the supply chamber forwards it constantly to the fire as fast as consumed, and at the same time gradually drifts the cinders upon the inclined grate, at the lower end of which all incombustible matter is discharged automatically. The combination of the fuel chamber, combustion chamber, tight ash pit and discharge chimney in one continuous flue is believed to secure uniform combustion and the greatest amount of heat from a given quantity of fuel.]

34,715.—Thomas Fisler, of Camden, N. Y., assignor to J. P. Reed, of Philadelphia, Pa., for Improvement in Feed Bags:

I claim the connecting and folding rod attached to the bag, or it equivalent, and arranged as set forth and for the purpose specified.

34,716.—Charles Gregor (assignor to himself and Charles Schwitzer), of New York City, for Improvement in Machinery for Cutting Cork into Strips:

I claim, first, The revolving wheel, d, provided with the cutters, e and f, in the manner specified, and operating as set forth.

Second, I claim the arrangement of the feed box, provided with the rollers, i k l, gears, m n o and p, and pinion, q, and actuated from the wheel, d, whereby the cork is fed progressively to the action of the cutters, as set forth.

Third, I claim the knives, e e, with the dish-formed cutting edges, in combination with the wheel, d, substantially as set forth and for the purposes specified.

34,717.—B. B. Hanze, of Morrisville, Vt., assignor to Carlos Pierce, of Boston, Mass., for Improvement in Tents:

I claim the employment of an expanding and folding frame for distending the upper part of a tent, substantially as described.

34,718.—F. L. Kidder (assignor to himself and Frederick Hoeft), of Brooklyn, N. Y., for Improvement in Ice Cars:

I claim the platform, a, provided with the skates, or runners, and steered substantially as set forth, in combination with the propelling wheel or wheels, k, actuated substantially as specified.

34,719.—John Kinniburgh, of Schott's Iron Works, near Motherwell, Scotland, assignor to William Kinniburgh, of Newark, N. J., for Improved Wash or Coating for Metallic Molds:

I claim the employment, for the purpose specified, of a metallic mold, when used in connection with the wash composed of pitch or coal tar, barm or yeast, and charcoal or black lead, as described.

34,720.—E. C. Mackinney (assignor to himself and J. H. Powell), of Peekskill, N. Y., for Improved Device for Holding Harness Reins:

I claim, as an improved article of manufacture, a rein holder formed of the stationary plate, A, and an adjustable plate, C, actuated through the medium of the screw, B, as shown and described.

[The object of this invention is to obtain a simple and efficient device which may be attached to the dashboard or other convenient part of a vehicle, to hold the reins when the occupant or driver alights.]

34,721.—J. J. Müller (assignor to Frederick Frank and J. A. Tauber), of New York City, for Improved Ore Separator and Washer:

I claim, first, The arrangement of a series of shaking tables below and in front, respectively, of each other, and set on inclined slides and actuated in the manner and for the purposes specified.

Second, I claim the dow slats, d d, in combination with the shaking tables, for the purpose and as set forth.

Third and last, I claim the india-rubber buffers, h h, applied as specified, in combination with the shaking tables, in the manner and for the purpose set forth.

34,722.—A. Randel (assignor to J. J. Eckel), of New York City, for Improvement in Mode of Extracting Oil, Tallow, &c.:

I claim an oil press consisting of a bed, A, hollow plunger, B I, solid-ribbed curb, C a, surrounded by bands, C′, shrunk upon its periphery, perforated cylinder, D, perforated central discharge tube, E, supporting tube, E′, perforated plates, F G and H, and bars, c e g, all constructed, combined and arranged in the manner and for the purposes explained.

[The object of this invention is to afford a more ready means than has been hitherto devised for the exit or escape of the oil, or other grease from the substance under compression, and thereby not only effect a saving in power, but also cause the work to be performed in a much more thorough manner than usual.]

34,723.—S. H. Roper, of Roxbury, Mass., assignor to Elmer Townsend, of Boston, Mass., for Improvement in Hot-Air Engines:

I claim, as an improvement in hot-air engines in which the working cylinder is separated by a partition or diaphragm from the furnace or fire box, the arrangement of the valves and their communicating chambers and passages within a valve chest, F, on the outside of the shell or casing, A, substantially as and for the purpose set forth.

34,724.—R. O. Doremus and B. L. Budd, of New York City, for Improvement in Treating Gunpowder to Form Cartridges:

We claim, first, Forming the ordinary granulated gunpowder of commerce into solid shape suitable for use as cartridges, or for other purposes, by compacting the same in dry condition within molds, by pressure so applied as to condense said powder into the shapes, substantially as described.

Second, We claim the cartridge formed of powder in strata of different degrees of combustibility, and compacted as described and for the purposes set forth.

34,725.—R. O. Doremus and B. L. Budd, of New York City, for Improvement in Ball Cartridges:

We claim the described method of forming cartridges by uniting the ball directly with the compacted granulated powder, as set forth.

34,726.—G. W. Ayres, of Rahway, N. J., for Improvement in Portable Ovens:

I claim the arrangement of the shells of the oven forming the flues and the space for the non-conducting material, the exterior shell having the openings, as described, for the putting in and taking out of the non-conducting material, in combination with the furnaces and diaphragm, as recited.

I also claim the arrangement of the furnaces, diaphragm and flues, as set forth.

34,727.—Richard Montgomery, of New York City, for Improved Iron-Clad Vessels:

I claim, first, The angulated recesses in connection with the openings and hollow beams, by which the missile can be directed and conveyed across the ship, substantially as described.

Second, I claim, in combination with the recesses, the supporting solid beams, placed and operating in the manner as described, and for purposes set forth.

RE-ISSUES.

1,288.—T. J. Mayall, of Roxbury, Mass., assignor to J. H. Cheever, of New York City, for Improved Composition for the Manufacture of Emery Sticks and Wheels. Patented May 17, 1859:

I claim, first, The production of a new compound or composition of matter applicable to the manufacture of sticks, wheels or other tools for grinding, cutting or polishing metals, glass or other hard substances, by combining gutta percha and sulphur with powdered emery.

Second, I claim the production of a new compound or composition of matter applicable to the manufacture of sticks, wheels, or other tools, for polishing, grinding or cutting metals, glass or other hard substances, by combining gutta percha and sulphur with powdered emery and olive oil, or its equivalent.

1,289.—T. J. Mayall, of Roxbury, Mass., assignor to J. H. Cheever, of New York City, for Improved Composition for the Manufacture of Flexible Polishing Sticks and Wheels. Patented May 17, 1859:

I claim, first, As new articles of manufacture, suitable to grinding and polishing metals, glass, &c., sticks and other tools made of a flexible india-rubber or gutta-percha compound, having emery or other gritty substance incorporated with it.

Second, I claim as a new composition of matter india rubber or gutta percha combined with sulphur and powdered emery in the proportion and manner described, or in such other proportion and manner, as will produce a flexible compound by vulcanization.

1,290.—Thomas Spencer, of Syracuse, N. Y., for Improvement in the Manufacture of Common Salt. Patented May 29, 1860:

I claim adding to common salt after it has been drained and in a state of crystallization, the carbonate or bicarbonate of soda so as to unite the same with the impurities, as and for the purposes set forth.

1,291.—Thomas Spencer, of Syracuse, N. Y., for Improvement in the Manufacture of Common Salt. Patented Sept. 25, 1860:

I claim the admixture of sulphate of soda, or its equivalent, as set forth, with common salt in a crystallized state after being removed from the impure bath, or "mother liquor," for the purposes specified.

DESIGNS.

1,549.—J. J. Marcy (assignor to Edward Miller), of Meriden, Conn., Design for a Lantern.

1,550.—E. J. Ney (assignor to Lowell Manufacturing Company,) of Lowell, Mass., Six Designs for Carpet Patterns.

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PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes n the fees are also made as follows :—

On filing each Caveat	$10
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On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
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The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

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Persons having conceived an idea which they think may be patentble, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued n obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principle office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

V. J. M., of Ohio.—Whose inquiry was answered in the SCIENTIFIC AMERICAN, page 158, Feb. 8th, respecting the removal of scale in steam boilers, can obtain information respecting Baird's preparation for removing incrustations on boilers, by addressing James F. Levin, No. 23, Central Wharf, Boston. The article is highly recommended.

B. B., of Pa.—Good indelible ink for marking clothes is composed of nitrate of silver half an ounce, distilled water one ounce, and common carmine ink one ounce. If you desire to use thick ink for marking with a brush, add a little gum mucilage. The carmine ink should contain a little aqua ammonia. This ink will not become black until it is exposed to sun light. If it is not sufficiently black, add some more nitrate of silver—it is the coloring agent. Keep the bottle covered from the light or this ink will be rendered worthless.

N. S. H. & Co., Nebraska Territory.—You may remove the scale formed in the inside of your steam boilers, by placing about half a peck of slippery elm bark in the boiler before commencing in the morning, then blowing off the flocculent matter in the boiler occasionally during the day. After the fires have been withdrawn at night, from a steam boiler using hard water, it should be allowed to stand quietly for about half an hour, and about one quarter of its water then blown off. This will remove the precipitated carbonate of lime before it has had time to adhere to the metal, and become hard by cooling.

F. J. W., of Iowa.—We do not think you would effect any saving of fuel by superheating the steam which you use for distilling. It would be very easy for you to try the experiment, but you must be cautious and not raise the temperature too high, or you will not obtain good spirits.

H. S., of N. Y.—Shellac varnish is very liable to become white when applied to a cold surface. This may be the cause of your trouble in varnishing wood. As you use alcohol in your varnish and oil in the stain which you employ for the imitation of cherry, the white streaks, in all probability, are caused by the alcohol acting upon the oil, rendering it milky. Try the stain without the oil, and heat the wood before putting on the varnish,

C. A. W., of N. J.—We believe that an ounce of the chlorate of potassa to the gallon of water would make a solution of sufficient strength for saturating your lamp wicks.

D. S., of Mo.—If you intend to be a good practical engineer, first go into a machine shop, where steam engines are built, and learn the trade of a practical machinist. There are very few engineers who learn the trade of a blacksmith, but it is certainly an advantage to any machinist to be a blacksmith also.

J. E. C., of Ohio.—Your views are entirely correct with the exception of a misapprehension of the meaning of the word momentum. Though this word is popularly used to express the power of a moving body, it is not so used by philosophers; who employ the term *vis viva* for this purpose. It has long since been entirely settled that the power of a moving body, its living force, or *vis viva*—which is measured by the sum of the resistances required to bring it to a state of rest—is in proportion to the square of its velocity. The word momentum is used to express a mathematical idea which does not have its correspondence in nature; it is the mass of a moving body multiplied into its velocity, and hence the law, that "the momentum of a moving body is in direct proportion to its velocity," follows of necessity from the definition. See page 391, Vol. III. pages 22, 34, 118, Vol. IV and page 181, Vol. V. (new series) SCIENTIFIC AMERICAN.

C. T. R., of D. C.—We are not acquainted with any method of removing tatooed marks from the human body but by cutting them out, or blistering the skin and then generating a running sore for a few days before healing up.

T. P. P. R., of N. Y.—A cubic foot of water weighs 62½ pounds. By knowing the contents of your cistern in cubic feet you can easily tell the number of pounds of water in it. You will find a method of calculating the contents of a hollow sphere in any school arithmetic. Clear spruce balsam dissolved in alcohol makes a good varnish for pictures. Most varnish makers add some white gum mastic and gum sandarac to it.

W. C. F., of Ill.—There is no thorough work published on saw mills and saws, in which circular, muley, gate and gang saws are fully described in all their relations, modes of operation, power to drive them, &c.

S. M., of Mass.—You should never use dilute sulphuric acid to cleanse the skin of the hands when they are covered with soap, because the acid is neutralized by the alkali in the soap, and the grease is set free. Wash the hands thoroughly before you use the acid to remove the color from them. Do not be afraid of hurting your skin, as you may use the acid so weak in order that no injury may result from it.

A. N. O., of N. Y.—The priority of inventions is always a vexed question. Capt. Coles, of England, unquestionably published plans for a revolving iron turret before the *Monitor* was built, but we understand that Capt. Ericsson claims to have presented drawings of a similar plan to the French government some years ago Many of the great inventions and discoveries have been made by different minds.

H. N. B., of Ill.—If you want a slanting roof perfectly proof against fire, and one that will need little or no repair, we know of nothing that will answer your purpose except slate.

C. R. S., of N. H.—We know of nothing better than zinc for coating iron to prevent it from rusting when placed in the ground.

H. N. O., of Mass.—India rubber has been applied between the tires and bodies of railroad wheels, and some patents have been taken on modes of applying it, the earliest dated 1846. We recollect reading, many years ago, of india rubber wheel tires for street vehicles having been applied in England, and think it was the subject of a patent there, but don't know that it was ever proposed to apply such tires to railroad wheels. We are of opinion, however, that the application to railroad weels would not be patentable, after the application to other wheels.

E. F. D., of Pa.—Your suggestion to interpose an elastic substance between the iron plates and bulwarks of a vessel is not new. It has been several times brought to our attention. It is an important field for experiment in our opinion.

J. M., of Mass.—We are not acquainted with any one engaged in the manufacture of worsted braid. We think it is generally imported.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park row, New York. Circulars about foreign patents furnished free.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, March 26, 1862:—

M. H., of Iowa, $15; C. B., of Mass., $15; M. V., of N. Y., $15; E. D. G., of Conn., $15; P. and B., of Mass., $28; D. C. A., of Mich., $25; I. S. S., of N. Y., $40; W. H. W., of N. Y., $15; J. M. W., of Iowa, $15; C. E. R., of N. Y., $15; M. H. S., of N. Y., $15; C. and A., of Conn., $25; J. C., of Mass., $15; O. T. S., of N. J., $20; P. F., of Vt., $45; W. D. B., of Mass., $20; A. J., of N. Y., $20; A. B. T., of Mich., $20; M. M., of N. Y., $20; J. B., of N. Y., $15; W. E. F., of N. Y., $25; W. H. C., of N. Y., $33; G. N., of Conn., $15; A. M., of N. H., $15; H. K., of Wis., $15; R. and B., of Ill., $15; E. F. B., of Conn., $15; P. B., of N. J., $15; E. J. W., of N. Y., $25; W. R., of Mich., $15; S. and T., of Pa., $15; A. B., of Conn., $350; N. F. E., of Vt., $30; C. C. C., of N. Y., $15; J. McH., of O., $25; T. C., of R. I., $60; K. H. E., of Vt., $20; G. L. S., of N. Y., $20; W. R. P., of O., $20; T. B., of N. Y., $45; W. H. C., of Mich., $20; J. C., of N. J., $25; C. G. S., of N. Y., $20; P. S. C., of N. Y., $25; J. I. P., of Pa., $25; M. P. M., of R. I., $10; J. M. LeC., of Wis., $15; T. H., of Cal., $100; J. H. W., of N. Y., $15; W. G., of Ind., $25; J. L. H., of Pa., $15; A. S. H., of Ill., $15; W. H. C., of N. Y., $30; H. S., of Mich., $15; G. P., of Iowa, $15; I. N. B., of N. Y., $20; B. and C., of Ind., $15; D. M., of N. Y., $20; W. and H., of R. I., $55 J. B. S., of Conn., $30; H. S., of N. Y., $20. C. H. P., of N. Y., $25; A. A. D., of N. Y., $25; G. T., of N. Y., $20; J. C., of N. Y., $15; W. P., of Mich., $25; W. C., of Ohio, $28; A. K., of Oregon, $60; C. W. R., of Mich., $25; F. R. W., of Cal., $15; R. W. G., of Me., $20; A. H. N., of Mass., $20; R. H., of Cal., $20; W. H. H., of Conn., $20.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from March 19 to Wednesday, March 26, 1862:—

W. and H., of R. I.; J. C., of N. J.; A. M., of N. H.; W. E. F., of N. Y.; C. W., of N. Y.; C. and A., of Conn.; O. S., of N. J.; P. S. C., of N. Y.; M. M., of N. Y.; T. H. A., of Ill.; J. I., of Pa.; H. and S., of N. Y.; C. G. S., of N. Y; A. A. D., of N. Y.; W. H. C., of N. Y.; J. B. S., of Conn.; D. C. A., of Ill.; C. H. P., of N. Y.; H. B., of Conn.; J. McH., of Ohio; N. F. E., of Vt.; W. G., of Ind; C. W. R., of Mich.; W. P., of Md.; S. R., of England.

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TRAIN'S UNION SPEECHES. Published by Frederick A. Brady, No. 24 Ann street, New York City. Price 25 cents.

George Francis Train has resided in London for some time past, and has been very successful in introducing into that city the American style of city railways. Ever since the breaking out of the rebellion Mr. Train has written and spoken against it with great effect—his speeches abounding in pungent arguments and keen satire of wit and good humor. He has done the country great service by his telling blows against secession. We see by a note on the cover of the work, a copy of which we have just received from the publisher, that the profits of the publication are to be devoted to the establishing of the *London American*, a valuable organ of our cause, now published in London. Train's speeches are well worth reading.

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TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design atents, when two good drawings are all that is required to accompany he petition, specification and oath, except the government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
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Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to compute the amount they must send in when they wish advertisements inserted, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns ; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

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14 4

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Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

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Immediately after the appointment of Mr. Holt to the office of Postmaster General of the United States, he addressed to us the subjoined very grateful testimonial:—

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Your obedient servant, J. HOLT.

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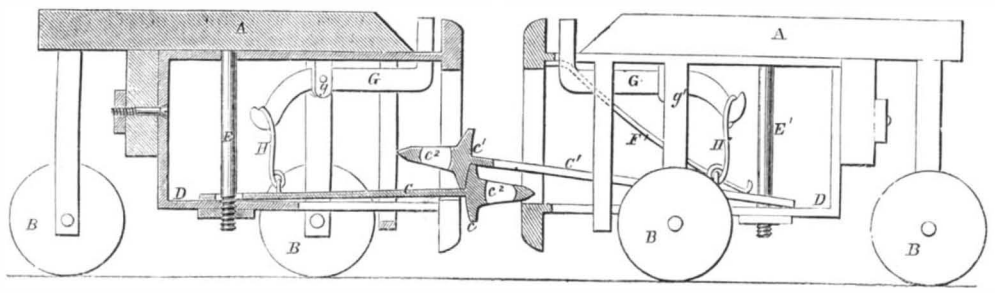
Improved Automatic Car Coupling.

The annexed cut represents an improved car coupling recently invented by Thomas L. Birch and John C. Noble, and for which a patent was procured through the Scientific American Patent Agency on the 4th of February, 1862.

A A represent portions of the truck frames, and B B the wheels. C C′ are coupling bars resting upon bed plates, D D, and secured at their inner ends upon vertical rods, E E′; F′ represents a spring which presses upon the bar C′ at a short distanee from its rear end, so as to permit the elevation or depression



BIRCH AND NOBLE'S AUTOMATIC CAR COUPLING.

of the outer end of the bar, and to restore it instantly when released. A similar spring presses down the bar, C; G G are foot levers having their fulcra at g g′, and connected at their inner ends (by means of links, H H′) with the bars, C C′, forward of the point at which the pressure of the springs, F′, is applied. The outer ends of these levers project above the platform of the car, and by the pressure of the foot upon one or the other of them, the bar, C or C′, may be raised. The outer ends of the bars, C C′, are formed with tapering heads, having hooks or shoulders, *c c′*, projecting upward and downward.

The cars being run together, either of the bars, C C′, which happens to be the higher, rises upon the other, the springs, F′, yielding sufficiently to allow the hooks to pass and then locking them securely together. When it is desired to uncouple the cars, the brakeman, noticing at a glance which bar, C or C′, is uppermost, applies his foot to the lever, G or G, which is connected with the upper bar, and the cars are instantly detached.

It is entirely immaterial which of the bars is uppermost when they come together, and any inequality in the hight of the cars or in the surface of the rails will not interfere with the operation of the device. No special adjustment is required and the necessity of putting the hand between the buffers is entirely avoided. Furthermore, a hooked bar of similar form being applied to each end of every car, any two cars will couple either way, without a possibility of mismatching. A slot, c^2 c^2, is cut through each of the heads of the bars, C C′, so that a car provided with this coupling may be attached to an ordinary car in the usual way.

This invention combines simplicity, efficiency, ease and rapidity of operation in a very remarkable degree.

Further information may be obtained by addressing either of the patentees at Washington, Washington County, Pennsylvania.

Lacquering Brass.

The lacquer commonly employed for this purpose is made by dissolving shell-lac in alcohol, and coloring it with a mixture of turmeric and dragon's blood or annato. The dragon's blood or annato gives brass a more ruddy color, so as to make it resemble gold.

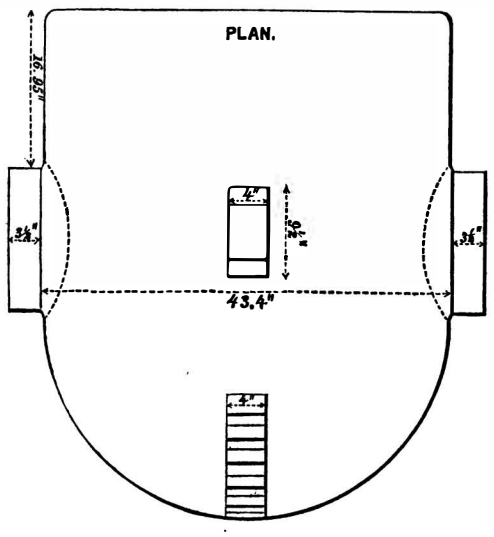
Lacquer may be pale or deep in tint, when it is known as pale or bronze lacquer, or it may be variously colored. A transparent colorless lacquer is a desideratum for German silver; a substance called bleached shell-lac is used for very pale lacquer. The lacquer is warmed and brushed over the article, which has been also previously warmed on a stove. If the temperature is too cold, a dullness of surface is produced, which is not removed by re-heating.

The surface of brass is frequently colored or bronzed after dipping, and before lacquering. A dark grey coating is produced by dipping the article in a solution of arsenious and hydrochloric acid; by applying dilute aqueous solution of bichloride of platinum; by applying an aqueous solution of corrosive sublimate mixed with vinegar; or by rubbing plumbago over the surface. By the application of lacquer to the surface of brass which has received a dark grey coating by any of these processes, a bronze-like tint is produced, due to the light reflected through the lacquering from the bright surface underneath; the same effect may be produced by rubbing plumbago over writing paper, and then lacquering.

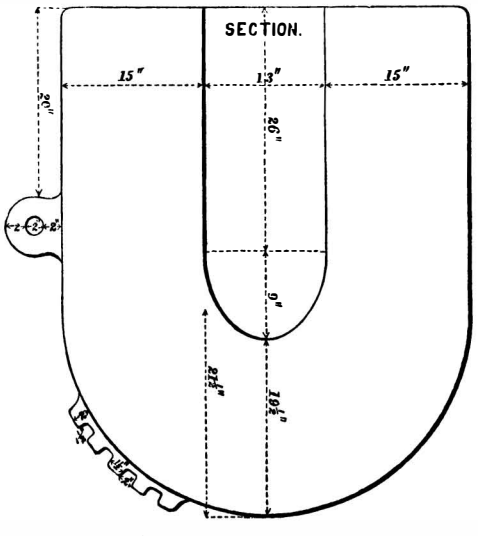
For common work the corrosive sublimate bronze is extensively used, but it causes trouble when used in contact with soft solder, with which the reduced mercury amalgamates. The plantinum process is used for instruments such as theodolites, &c.; in these the bronze is much blacker, as pale is employed instead of yellow lacquer.

Sea-Coast Mortar.

The accompanying engravings represent the largest size of mortar for throwing bombshells which is



used in the United States service. The engravings are made from drawings procured from the Fort Pitt Foundry, and of course are accurate representations of the mortars which are being cast at the present time. These mortars throw a shell 13 inches in di-



ameter, and their dimensions are given in the cuts. The extreme length is 4 feet 6½ inches, external diameter 3 feet 7 inches, and the weight is 12,200 lbs. The elevation of the piece is varied to suit the range desired by means of the rack upon the breech. These mortars are employed for sea-coast operations, and also on Com. Foote's Mississippi mortar flotilla.

The testing of the armor-plates from the works of the Thames Iron Ship Company, the Atlas at Sheffield, and the Lancefield at Glasgow, were recently brought to a conclusion. The plates as usual were affixed to the sides of the *Java*, and the practice took place from the guns of the *Stork* at 200 yards range. They were merely plates selected at each of the works by the government Inspector from those manufactured in accordance with the right reserved by the Admiralty in their contracts with the manufacturers, and their testing was, therefore, unattended by any point of interest to the public. The "hammered" plate, however, supplied by the Thames Iron Shipbuilding Company proved to be so superior that it will very probably be the cause of re-opening the question of "hammered *vs.* rolled" armor-plates.

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